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CONCURRENT RESOLUTION ON THE BUDGET FOR FISCAL YEAR 1990

HEARINGS

BEFORE THE

COMMITTEE ON THE BUDGET
UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

FIRST SESSION

SCIENCE, TECHNOLOGY, AND STRATEGIC ECONOMIC POLICY
MARCH 9, 1989

NATIONAL SECURITY
MARCH 14, 1989—VIEWS OF THE SECRETARY OF DEFENSE
MARCH 14, 1989—DEFENSE BUDGETARY CHOICES FOR THE 1990'S: VIEWS OF OUTSIDE DEFENSE EXPERTS

VIEWS OF THE SECRETARY OF ENERGY
MARCH 15, 1989

Volume III of III

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SCIENCE, TECHNOLOGY, AND STRATEGIC ECONOMIC POLICY

THURSDAY, MARCH 9, 1989

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Washington, DC.

The committee met, pursuant to notice, at 10:05 a.m., in room SD-608, Dirksen Senate Office Building, Hon. Jim Sasser (chairman of the committee) presiding.

Present: Senators Sasser, Hollings, Simon, Sanford, Wirth, Fowler, Domenici, Grassley, Kasten, and Bond.

Staff present: John L. Hilley, staff director; and Phillip Kardis, analyst for science, space, and technology.

For the minority: G. William Hoagland, staff director; and Bill Hughes, senior analyst for transportation and science.

OPENING STATEMENT OF CHAIRMAN SASSER

Chairman SASSER. The committee will come to order.

Today, we are pleased to welcome a panel of very distinguished guests to a hearing on science, technology, and strategic economic policy. With us are Dr. Frank Press, the president of the National Academy of Sciences. We will be joined later by Clyde Prestowitz of the Carnegie Endowment, and we are pleased to have Dr. Robert Rosenzweig with us this morning, the president of the Association of American Universities.

I might say, gentlemen, that there are few areas as challenging to us as science and technology. They are the keys to our economic future.

This year, the Bush budget proposes significant increases in funding for science and technology programs. The President asked for a 20-percent increase in budget authority for the science, space and technology function of the budget.

But the need to reduce the deficit means that we may not be able to increase funding for science programs as much as we would like to do. Consequently, we need to do a much better job at setting priorities and making choices among competing science projects. We may eventually need to reorganize our science policymaking process to more clearly focus the Federal science enterprise.

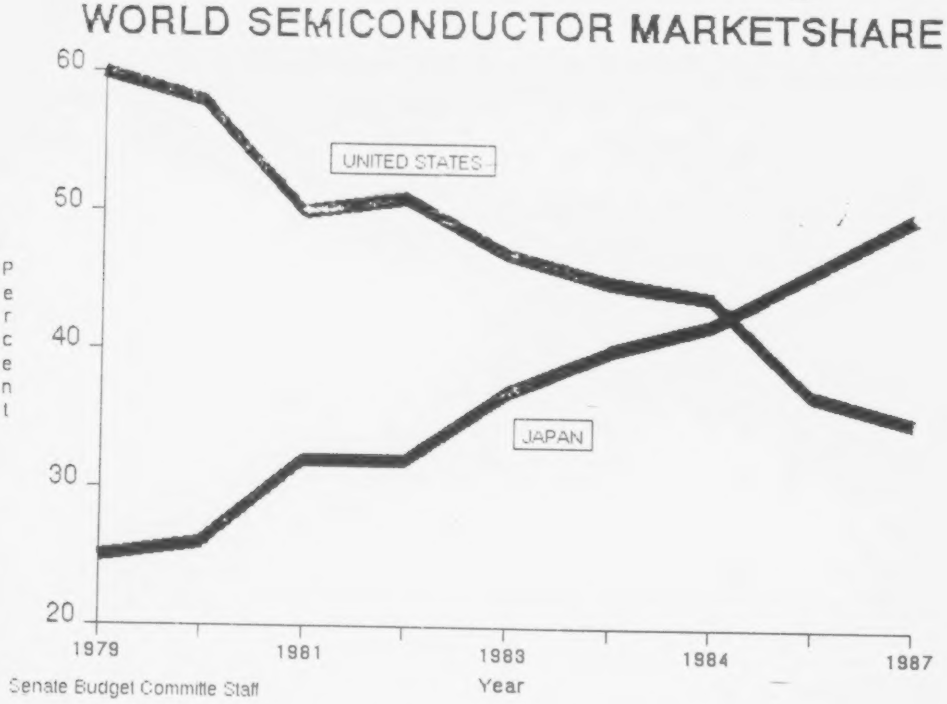
This will be a tough task. Dr. Press, you and the national academies have spent a great deal of time on this very issue. Your report, *Federal Science and Technology Budget Priorities,* provides an extremely useful framework for improving the way we make choices among competing science and technology programs.

Our scientific and technological base underpins our economy. Setting science priorities is not only important from the budget perspective, it is also central to maintaining our economic strength and military power. We cannot continue to fall behind our key trade competitors in civilian research and development investment and scientific education.

The dangers inherent in a decline in American scientific leadership I think are epitomized by the deterioration of the U.S. share of the world's semiconductor market.

I direct my colleagues' attention to chart 1 in the back of the room, which shows the loss of our share of the semiconductor market to the Japanese so quickly that, in 10 short years, our relative positions in the semiconductor business are almost exactly reversed. We have gone from 60 percent of the market down to about 30 percent, and the Japanese have climbed from about 15 percent up to over 50 percent. We are now in second place in semiconductors.

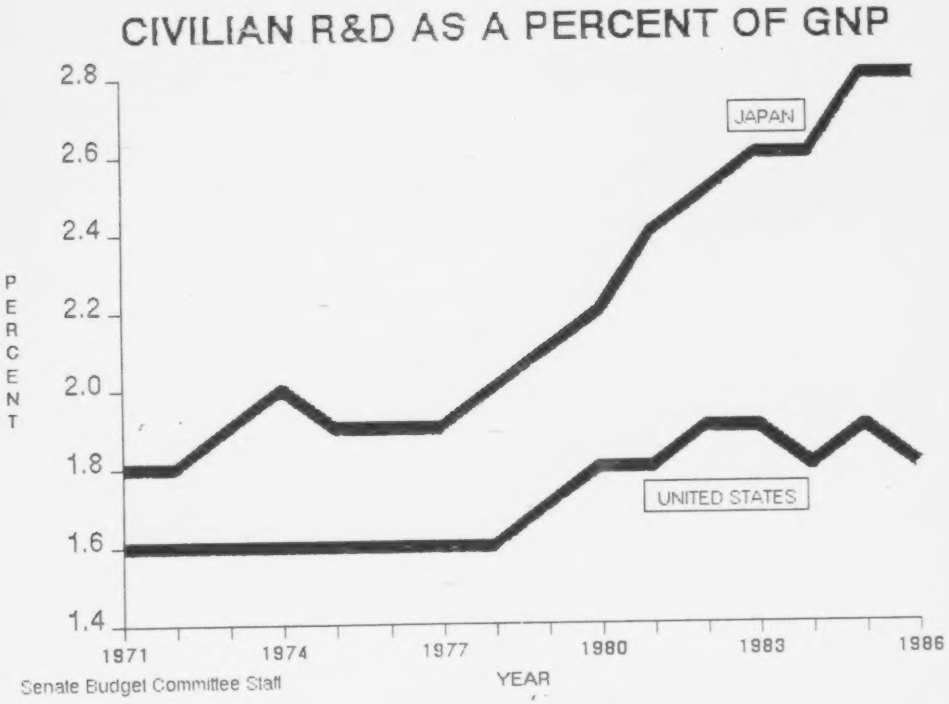
CHART 1



This trend, I think, should serve as a call to immediate action, but I perceive that our response has been both slow and haphazard.

Our economic competitors have not been standing still. As the chart 2 shows, the Japanese have been especially active. While Japan's gross national product has been rapidly increasing, their spending on civilian research and development has been increasing even faster.

CHART 2



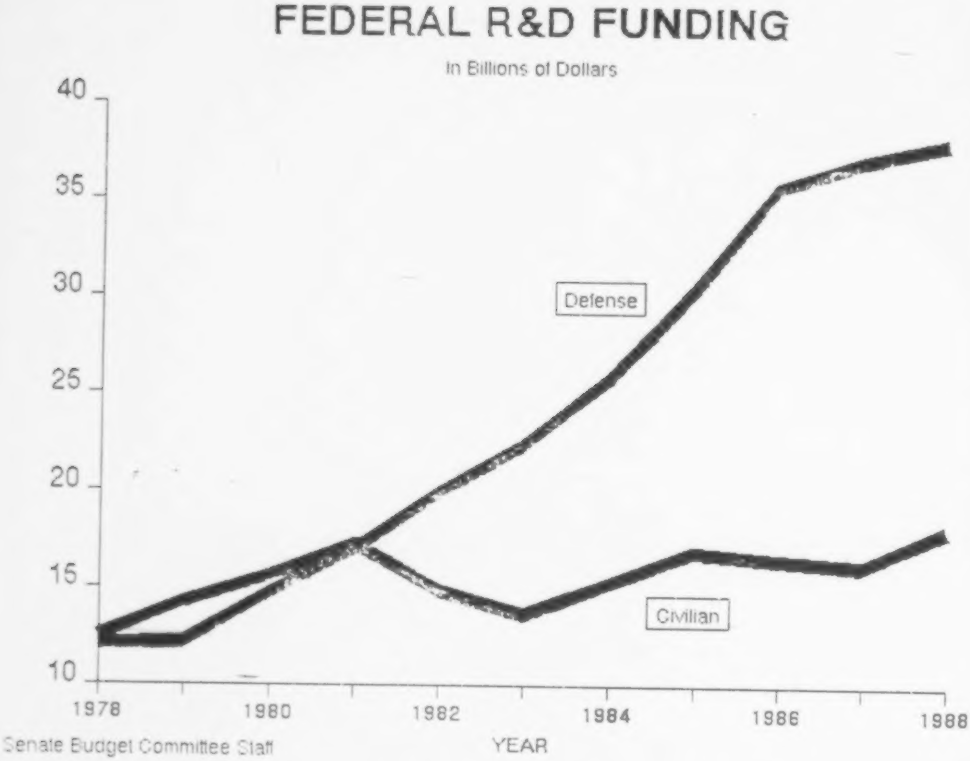
Senate Budget Committee Staff

As we look at the chart, we see that Japanese spending on R&D as a percent of GNP has been going up very, very rapidly, while United States spending as a percent of GNP has been relatively stationary since 1980, with some ups and downs.

I believe it is time to readdress this imbalance, time to look for a better balance between spending for such research.

Let us look at our final chart here, chart 3, which shows our choice has been to increase defense-related research and development. I believe it may be the time now to readdress this choice. Defense R&D has been going up, while civilian R&D has remained relatively static. And I might say that the "D" part of defense R&D has been emphasized. There has been very little basic research going on in the defense area.

CHART 3



Congress and the administration agree that science and technology programs are necessary for our future. But we need to be able to make better choices among the opportunities that now present themselves in science and technology. We need to more clearly focus these investments toward expanding our economic growth over the long term.

Chairman SASSER. I would turn now to my distinguished colleague from South Carolina for any opening statements or observations he might wish to make.

OPENING STATEMENT OF SENATOR HOLLINGS

Senator HOLLINGS. You are mighty kind, Mr. Chairman. I am impressed because you are right on target with the final one. I was looking at the investment in R&D, and we make it still in this country, but it is all on the military end, and distorted even in that sense where should high definition television be.

Dr. Press, I have to put it over on defense because I cannot get it into commerce. I do not know what commerce is supposed to do other than take a census, maybe. They have gotten out of the oceans and everything else. And so when they try to get some trade policy and develop civilian technology—and so I can get 30 million, and I can get in the committee and everybody nods and we put it in, high definition R&D, and we put it over in defense, and we do not put it in the civilian side. It belongs, really, in civilian usage, as I am sure you agree.

Thank you very much, Mr. Chairman. I am delighted to hear these gentlemen.

Chairman SASSER. Thank you, Senator Hollings.

We are pleased to have Dr. Frank Press, the president of the National Academy of Sciences, here today, and we are pleased to have him joined by Dr. Rosenzweig, the president of the American Association of American Universities.

Gentlemen, we are eager to hear from both of you, and we expect to be joined later by Mr. Prestowitz, who unfortunately, through a scheduling conflict, is testifying before another committee at the present time.

We will begin with you, Dr. Press.

STATEMENT OF DR. FRANK PRESS, PRESIDENT, NATIONAL ACADEMY OF SCIENCES

Dr. PRESS. Mr. Chairman, Senator Hollings, I am pleased to be here to discuss our recommendations recently made in our report, "Federal Science and Technology Budget Priorities," prepared in response to the request of this committee and the House Budget Committee. I would like to submit the full report for the record and only summarize a few of its main points.[1]

First, however, I want to comment on some encouraging developments since we released our report in December. We have met with a number of officials in the executive branch, including the director of the Office of Management and Budget, and with several Members of Congress. We believe that our perspectives on the crosscutting nature of many Federal science and technology activities, and the need to evaluate them throughout the budget process, have begun to influence or reinforce thinking in the executive branch. These points are reflected in both the Reagan and Bush administration fiscal year 1990 budget submissions to Congress.

For example, the "Special Analysis on Research and Development" in President Reagan's budget message states: "Most Federal R&D is done in direct support of agency mission needs. Most agencies have a well-defined process for establishing their R&D priorities. However, there are cases where R&D activities cut across several agencies, or where R&D projects are of such a magnitude as to force choices either within or between agencies. The Executive budget formulation process has focused on specific areas for crosscutting review." That is the end of the quote, and that is quite consistent with our recommendations.

Reiterating this theme in his budget message, "Building a Better America," President Bush promised that the Office of Science and Technology Policy "will play a central role in developing and coordinating Federal science and technology strategies, and in analyzing crosscutting issues in research and development. The Assistant to the President for Science and Technology (will) also assist OMB in developing plans for multi-year authorizations and appropriations for research and development programs."

We are encouraged by these statements and hope that more concrete steps will follow along the lines I am going to discuss this morning. We are not content simply with having prepared and presented this report. We hope to work with the Executive Office, the agencies, and the responsible committees of Congress to make real improvements in Federal budgeting for science and technology.

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[1] See p. 20.

Our report contains three types of recommendations. First, we propose a framework for guiding Federal science and technology budget preparation and assessment. Second, we suggest a set of criteria in the form of questions that can be helpful in judging whether the allocations for science and technology resources are serving national objectives. Third, we recommend feasible changes in the executive branch process of preparing science and technology budget proposals and in the congressional process of reviewing administration requests and appropriating funds. I will briefly review each set of recommendations.

First, the framework for assessing science and technology budgets. It is important to examine proposed expenditures for science and technology in relation to the national purposes they serve. We suggest four categories. These categories are not mutually exclusive for the obvious reason that most science and technology efforts are intended to serve more than one purpose.

The first category is science and technology activities supporting sponsoring agencies' missions. Most agencies use science and technology to enable them to discharge their missions. These are basic governmental functions serving the national welfare. Current budget processes and organization do reasonably well in assessing the mix, level, and quality of science and technology in relation to an agency's other activities and in deciding resource allocations accordingly.

Second, maintenance and advancement of the Nation's science and technology base. Achieving national and agency objectives—from economic growth to an adequate defense—depends in the long run on the education and training of talented people, the production of new knowledge through research, and the provision of related facilities and equipment—what we commonly refer to as the Nation's science and technology base. Maintaining and improving this capacity are responsibilities of several agencies; but in the current budget process, little attention is paid to the contribution of any single agency or to the adequacy of investments in the aggregate across all of the agencies in replenishing the science and engineering manpower and infrastructure.

The third category is activities, usually of several agencies, that contribute to broad national objectives of the President or Congress or both. Recent experience suggests that an increasing share of these objectives will have prominent science and technology components—for example, industrial competitiveness that Senator Sasser referred to and global environmental protection—and that the support of relevant science and technology frequently is dispersed among several agencies. The formulation of science and technology budgets in these areas should entail review and judgments about the respective roles of the agencies involved and the effectiveness of the aggregate programs of all of the agencies.

The fourth category comprises major and costly science or engineering initiatives that require large incremental expenditures. From time to time, scientific or technological opportunities arise that require very large expenditures over a number of years. Examples are the superconducting supercollider, the project to map and sequence the entire human genome, and the space station. Projects of this sort will fall in one or more of the above three categories, and their priority should be judged primarily within those contexts. For example, the utility of the space station depends primarily upon how the Nation's political leadership defines America's objectives in space, and, in particular, the role of manned space exploration. Because of their complexity, costs, and multiyear commitments, these large projects impinge on the funding of activities in other categories and therefore merit special analysis from that point of view.

In the final section of the report, we consider what changes in the budget process are needed and are possible to achieve. In our judgment, the current budget process provides for reasonably thorough consideration of the contributions of agency science and technology programs to agency objectives ranging from advances in weapon system capabilities and health care to technical standards development and agricultural productivity. We do not propose that this decentralized approach be fundamentally changed, for it has contributed not only to a variety of Government missions but also to the strength of the U.S. science and technology enterprise as a whole. Indeed, countries with highly centralized research systems have shown growing interest in emulating our pluralistic system.

Nevertheless, we believe that improvements can be made in both the executive and congressional phases of budget preparation and review, especially for those categories of purpose that involve the contributions of several agencies and span the jurisdictions of several congressional committees.

We propose that the President provide the agencies with guidance on crosscutting science and technology budget considerations early in the budget cycle. Such guidance is now lacking. This will enable agencies to respond more effectively to both their mission needs and the broader national priorities that are of concern to the President. This guidance can be used by others—OMB, Congress and its support agencies, and affected interests—to assess agency proposals in relation to the President's priorities.

We envision that the President's science and technology adviser will work closely with OMB to prepare both the guidance and the evaluations. The council of science and technology advisers favored by President Bush would be one way to involve the scientific and engineering communities, along with the principal adviser's direct personal contacts with broad elements of the community. The guidance recommended to and issued by the President might emphasize support of graduate training in the physical sciences and engineering or the advancement of generic manufacturing technologies or research on global climate change or exploration of long-range applications of high temperature superconductors. This guidance, with an analysis of how it is reflected in agency budget proposals, should accompany the President's budget submission to Congress.

If the President's budget preparation and presentation follow these recommendations, Congress will receive an explicit statement of the administration's science and technology priorities. Budget allocations for related science and technology programs across agencies will be displayed. Congress will then have more information, more of a rationale than it currently obtains, as a basis for evaluating the President's priorities.

For the process to be effective, Congress should make complementary adjustments in its budget process. In particular, Congress should devise arrangements enabling it to consider the proposed science and technology budget allocations as they relate to the crosscutting categories of purposes before the budget is disaggregated for consideration on an individual agency basis. It is, therefore, an appropriate function of the Budget Committees, perhaps the authorizing committees with broad S&T oversight jurisdiction, the Appropriations Committees, or some combination of these committees. In any case, recommended changes in the President's budget proposals need to be communicated to the Appropriations subcommittees so that they will be aware of the broader consequences of their actions on individual agency budgets.

We also endorse a 2-year funding cycle. If Congress decides to experiment with biennial appropriations rather than to move all at once to a 2-year budget, we believe that the science and technology programs should be leading candidates for such a trial.

Finally, I want to bring to the committee's attention an issue in our deliberations that confuses the true nature of the Federal Government's R&D investments, which as usually defined exceeds $67 billion in the proposed fiscal year 1990 budget. The issue is the treatment of the Department of Defense research and development activities in the national R&D statistics. Combining the entire DOD R&D budget with the R&D activities of the civil agencies in an uncritical manner may overstate the magnitude of the Nation's science and technology effort. Basic and applied research, exploratory development, and perhaps some of the advanced development in DOD are similar to civilian agency science and technology activities. But the great bulk of what is now identified as defense R&D, however, is directed toward specific military equipment development, testing, evaluation and prototype procurement and is not comparable to other Federal science and technology activities. Under these assumptions, the actual Federal R&D investment is probably closer to $40 billion. We believe that the administration should convene a group of experts to clarify the extent to which DOD research and development activities are comparable to the civilian research and development. This should be included in assessing the adequacy of the overall U.S. effort or comparing the U.S. effort with that of other countries.

The recommendations I have highlighted and others in our report could help ensure that budgets for science and technology are treated in a manner that reflects their importance in national affairs and their contributions to presidential and congressional objectives.

Thank you.

Chairman **Sasser**. Thank you very much, Dr. Press.

[The prepared statement of Dr. Press and the report "Federal Science and Technology Budget Priorities" follow:]

STATEMENT OF

FRANK PRESS
PRESIDENT, NATIONAL ACADEMY OF SCIENCES

BEFORE

THE COMMITTEE ON THE BUDGET
UNITED STATES SENATE

MARCH 9, 1989

Mr. Chairman and members of the Committee, I am pleased to be here to discuss the recommendations that the National Academy of Sciences, together with the National Academy of Engineering and the Institute of Medicine, recently made in our report, Federal Science and Technology Budget Priorities, prepared in response to the request of this Committee and the House Budget Committee. As you know, this request was contained in the conference report on the FY 1989 budget resolution. I would like to submit the report for the record and summarize its main points.

First, however, I want to comment on some encouraging developments since we released our report in December. We have met with a number of officials in the Executive Branch, including the director of the Office of Management and Budget, and with several members of Congress. We believe that our perspectives on the crosscutting nature of many federal science and technology activities, and the need to evaluate them throughout the budget process, have begun to influence or reinforce thinking in the Executive Branch. These points are reflected in both the Reagan and Bush Administration FY 1990 budget submissions to Congress.

For example, the "Special Analysis on Research and Development" in President Reagan's budget message states:

> ...Most Federal R&D is done in direct support of agency mission needs. Most agencies have a well-defined process for establishing their R&D priorities.... However, there are cases where R&D activities cut across several agencies, or where R&D

> projects are of such a magnitude as to force choices either within or between agencies.... The Executive budget formulation process has focused on specific areas for crosscutting reviews....

Reiterating this theme in his budget statement, "Building a Better America," President Bush promises that the Office of Science and Technology Policy

> ... will play a central role in developing and coordinating Federal science and technology strategies, and in analyzing crosscutting issues in research and development. The Assistant to the President for Science and Technology (will) also assist the Office of Management and Budget in developing plans for multi-year authorizations and appropriations for research and development programs....

We are encouraged by these statements and hope that more concrete steps will follow along the lines I am going to discuss this morning. The Academies are not content simply with having prepared and presented this report. We hope to work with the Executive Office, the agencies, and the responsible committees of Congress to make real improvements in federal budgeting for science and technology.

Our report contains three types of recommendations. First, we propose a framework for guiding federal science and technology budget preparation and assessment. Second, we suggest a set of criteria in the form of questions that can be helpful in judging whether allocations for science and technology resources are serving national objectives. Third, we recommend feasible changes in the Executive Branch process of preparing science and technology budget proposals and in the congressional process of reviewing Administration requests and appropriating funds. I will review briefly each set of recommendations.

A Framework for Assessing Science and Technology Budgets

It is important to examine proposed expenditures for science and technology in relation to the national purposes they serve. We suggest four categories. These categories are not mutually exclusive for the obvious reason that most science and technology efforts are intended to serve more than one purpose.

1. Science and technology activities supporting sponsoring agencies' missions. Most agencies use science and technology to enable them to discharge their missions. These are basic governmental functions serving the national welfare. Current budget processes and organization do reasonably well in assessing the mix, level, and quality of science and technology in relation to an agency's other activities and in deciding resource allocations accordingly.

2. The maintenance and advancement of the nation's science and technology base. Achieving national and agency objectives -- from economic growth to an adequate defense -- depends in the long run on the education and training of talented people, the production of new knowledge through research, and the provision of related facilities and equipment -- what we commonly refer to as the nation's science and technology base. Maintaining and improving this capacity are responsibilities of several agencies; but in the current budget process, little attention is paid to the contribution of any single agency or to the adequacy of investments in the aggregate in replenishing science and engineering manpower and infrastructure.

3. The activities, usually of several agencies, that contribute to broad national objectives of the President or Congress or both. Recent experience suggests that an increasing share of these objectives will have prominent science and technology components -- for example, industrial competitiveness and global environmental protection -- and that the support of relevant science and technology frequently is dispersed among several agencies. The formulation of science and technology budgets in these areas should entail review and judgments about the respective roles of the agencies involved, the relative contribution of science and technology, and the issues to be

addressed by science and engineering. We note that the Executive Branch has made a valuable start on such crosscutting analyses with its recent report, Our Changing Planet: A U.S. Strategy for Global Change Research, a product of an interagency group under the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET).

4. Major and costly science or engineering initiatives that require large incremental expenditures. From time to time scientific or technological opportunities arise that require very large expenditures over a number of years. Examples are the Superconducting Super Collider, the project to map and sequence the entire human genome, and the space station. Projects of this sort will fall in one or more of the above three categories, and their priority should be judged primarily within those contexts. For example, the utility of the space station depends primarily upon how the nation's political leadership defines America's objectives in space and, in particular, the role of manned space exploration. Because of their complexity, costs, and multiyear commitments, these large projects impinge on the funding of activities in other categories and therefore merit special analysis from that point of view. It is especially important that future outlays for all large projects receive systematic review.

Questions to Guide Resource Allocation

The second part of our report consists of a list of questions that should be asked about activities in each of the categories to guide resource allocation decisions during the budget process. The questions set the parameters for analyses that can inform the initial development of presidential budget priorities conveyed to departments and agencies. The questions can also be used in evaluating budget proposals from their inception in agencies through their review by the Office of Management and Budget and the President and their consideration in Congress.

Building on the Current Process

In the final section of the report we consider what changes in the budget process are needed and are possible to achieve. In our judgment, the current budget process provides for reasonably thorough consideration of the contributions of agency science and technology programs to agency objectives ranging from advances in weapon system capabilities and health care to technical standards development and agricultural productivity. We do not propose that this decentralized approach be fundamentally changed, for it has contributed not only to a variety of government missions but also to the strength of the U.S. science and technology enterprise as a whole. Indeed, countries with highly centralized research systems have shown growing interest in emulating our pluralistic system.

Nevertheless, we believe that improvements can be made in both the executive and congressional phases of budget preparation and review, especially for those categories of purpose that involve the contributions of several agencies and span the jurisdictions of several congressional committees.

We propose that the President provide the agencies with guidance on crosscutting S&T budget considerations early in the budget cycle. Such guidance is now lacking. This will enable agencies to respond more effectively to both their mission needs and the broader national priorities that are of concern to the President. This guidance can be used by others -- OMB, Congress and its support agencies, and affected interests -- to assess agency proposals in relation to the President's priorities.

We envision that the President's Science and Technology Adviser will work closely with OMB to prepare both the guidance and the evaluations. The council of S&T advisers favored by President Bush would be one way to involve the scientific and engineering communities, along with the principal adviser's direct personal contacts with broad elements of the community. The guidance recommended to and issued by the President might emphasize support of graduate training in the physical sciences and engineering or the advancement of generic manufacturing technologies or research on global climate change or exploration of long-range applications of high-temperature superconductors. This guidance, together with an analysis of how it is reflected in agency budget proposals, should accompany the President's budget submission to Congress.

If the President's budget preparation and presentation follow these recommendations, Congress will receive an explicit statement of the Administration's S&T priorities. Budget allocations for related science and technology programs across agencies will be displayed. Congress will then have more information than it currently obtains as a basis for evaluating the President's priorities.

For the process to be effective, Congress should make complementary adjustments in its budget process. In particular, Congress should devise arrangements enabling it to consider the proposed science and technology budget allocations as they relate to the crosscutting categories of purposes before the budget is disaggregated for consideration on an individual agency basis. It is therefore an appropriate function of the Budget Committees, the authorizing committees with broad S&T oversight jurisdiction, the Appropriations Committees, or some combination of these committees. In any case, recommended changes in the President's budget proposals need to be communicated to the Appropriations subcommittees so that they will be aware of the broader consequences of their actions on individual agency budgets.

We also endorse a two-year funding cycle. If Congress decides to experiment with biennial appropriations rather than to move all at once to a two-year budget, we believe that S&T programs should be leading candidates for such a trial.

The National R&D Investment

Finally, I want to bring to the Committee's attention an issue in our deliberations that confuses the true nature of the federal government's R&D investment, which as usually defined exceeds $67.0 billion in the proposed FY 1990 budget. The issue is the treatment of Department of Defense R&D activities in national R&D statistics. Combining the entire DoD R&D budget with the R&D activities of the civil agencies in an uncritical manner may overstate the magnitude of the nation's science and technology effort. Basic and applied research, exploratory development, and perhaps some of the advanced development in DoD are similar to civilian agency S&T activities. The great bulk of what is now identified as defense R&D, however, is directed toward specific military equipment development, testing, evaluation and prototype procurement and is not comparable to other federal S&T activities. Under these assumptions, the actual federal R&D investment is probably closer to $40.0 billion. We believe that the Administration should convene a group of experts to clarify the extent to which DoD R&D activities are comparable to civilian R&D.

Conclusion

The recommendations I have highlighted and others in our report could help ensure that budgets for science and technology are treated in a manner that reflects their importance in national affairs and their contributions to presidential and congressional objectives.

Federal Science and Technology Budget Priorities

New Perspectives and Procedures

NATIONAL ACADEMY OF SCIENCES
NATIONAL ACADEMY OF ENGINEERING
INSTITUTE OF MEDICINE

Federal Science and Technology Budget Priorities

New Perspectives and Procedures

A Report in Response to the Conference Report
on the Concurrent Resolution on the Budget
for Fiscal Year 1989 (H. Con. Res. 268)

NATIONAL ACADEMY OF SCIENCES
NATIONAL ACADEMY OF ENGINEERING
INSTITUTE OF MEDICINE

National Academy Press
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The National Academy of Sciences (NAS) is a private, self-perpetuating society of distinguished scholars in scientific and engineering research, dedicated to the furtherance of science and technology and their use for the general welfare. Under the authority of its congressional charter of 1863, the Academy has a working mandate that calls upon it to advise the federal government on scientific and technical matters. The Academy carries out this mandate primarily through the National Research Council, which it jointly administers with the National Academy of Engineering and the Institute of Medicine. Dr. Frank Press is President of the NAS.

The National Academy of Engineering (NAE) was established in 1964, under the charter of the NAS, as a parallel organization of distinguished engineers, autonomous in its administration and in the selection of members, sharing with the NAS its responsibilities for advising the federal government. Dr. Robert M. White is President of the NAE.

The Institute of Medicine (IOM) was chartered in 1970 by the NAS to enlist distinguished members of appropriate professions in the examination of policy matters pertaining to the health sciences and to the health of the public. In this, the Institute acts under both the Academy's 1863 congressional charter responsibility to be an adviser to the federal government and its own initiative in identifying issues of medical care, research, and education. Dr. Samuel O. Thier is President of the IOM.

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INTRODUCTION AND SUMMARY

This report is in response to a request of Congress contained in the Conference Report on the Concurrent Resolution on the Budget for FY 1989, adopted on June 6, 1988. The Conference Report asked the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine to provide

> ... advice on developing an appropriate institutional framework and information base for conducting cross-program development and review of the nation's research and development programs. This should be structured in such a way that it can be used by both the Executive Branch and Congress as a method for reviewing program contents and strategies and in determining funding and organizational priorities for science and technology (House Report 100-658 on H. Con. Res. 268).

The request originated with the Senate Committee on the Budget, whose report on the Senate version of the FY 1989 Budget Resolution expressed dissatisfaction with the lack of a "coordinated national research and development budget" and suitable categories and criteria for judging the allocation of resources to and among science and technology (S&T) activities. In asking the help of the Academies and the IOM, the Senate Budget Committee emphasized the importance of a scientific and technical perspective in developing a framework for setting priorities in federal research and development (see Appendix 1).

This report has been prepared by a committee composed of the Presidents of the two Academies and the Institute of Medicine and members of their respective institutional councils. A group of Academy staff members, many with federal budget experience in various settings, provided support for the project. In addition to the committee's deliberations, the study process included consultation with members of Congress; staff of congressional budget, appropriations, and authorization committees and support agencies; officials of the Executive Branch; and other people knowledgeable about the federal budget process and policymaking for science and technology.

In interpreting its charge, the committee at the outset drew two conclusions that determined the scope and focus of its review:

> First, the analysis was to include all science and technology activities directly supported by the federal government, including the education of scientists and engineers and the financing and operation of specialized facilities as well as the conduct of research—basic and applied—and development. "Research and development" is the category conventionally used in budget submissions and analyses of expenditures, but the commit-

tee judged it important to encompass activities that are instrumental to but not necessarily counted as part of R&D, such as education.

Second, the analysis was to consider how public officials think about, prepare, and review science and technology budgets year in and year out. During the most recent budget cycle especially there has been a great deal of discussion about priorities among current federal S&T programs and projects; but it was not feasible for, nor was it expected of, this committee to recommend what resource allocations ought to be made this year or next. Rather, we suggest an analytical perspective and changes in the budget process that will aid decisions about resources for science and technology over the long term.

We have two concerns: Are we investing adequately for the long term to sustain the enabling S&T infrastructure and are we deciding priorities among S&T opportunities in a way that will best advance the national interest?

We recommend that S&T budget priorities be considered in four non-mutually exclusive categories:

- the S&T activities of individual agencies in relation to each agency's mission;
- the aggregate contribution of several agencies to the science and technology base of the nation, including fundamental research, its supporting infrastructure, and its continued production of scientists and engineers;
- the contribution of S&T activities, frequently supported by several agencies, to national objectives that are given priority by the President and/or Congress (e.g., industrial competitiveness, environmental protection, and prevention and treatment of AIDS);
- a set of major S&T initiatives, with different purposes and character, that attract attention in any budget year primarily because of their cost and budgetary consequences for other S&T activities across agencies.

For science and technology activities in direct support of agency missions there is an established process of budget development and review, beginning with agency proposals taking into account any initial administration guidance, running through the Office of Management and Budget (OMB) examination and any agency appeals, and culminating in congressional authorizations and appropriations. In this process responsibilities are reasonably well defined and the results generally serve agency objectives. We do not propose that this process be changed.

With regard to activities in the three categories that cut across several agencies, however, the process is unsystematic and sometimes haphazard because responsibility is dispersed. Without proposing major changes in the basic budget process, we recommend additional steps in current Executive Branch and congressional procedures to ensure that S&T budgets are more reflective of demonstrated needs and national priorities in these cross-cutting areas.

- The President's objectives in the cross-cutting S&T areas should be included in initial OMB instructions to the agencies for the preparation of their budgets, and these priorities should guide the formulation of the President's final budget proposal to Congress.
- The President's budget submission to Congress should contain a statement of his priorities for the S&T base, S&T activities serving national objectives, and major S&T initiatives as well as a summary of agencies' mission-related S&T activities.
- The congressional budget and appropriations committees should conduct reviews of cross-cutting S&T activities and incorporate their judgments into recommendations for agency budget allocations.
- Following the enactment of necessary authorizations and appropriations, the Executive Office of the President should work with agency heads to see that S&T programs are carried out in accordance with the President's priorities as modified by Congress.

We believe that these recommendations will serve the nation well in a period of pressing resource constraints and growing expectations that science and technology will yield significant material benefits.

SCIENCE AND ENGINEERING IN FEDERAL BUDGETS

Recent federal budgets for S&T demonstrate that Congress and the Administration recognize the growing opportunities in S&T and their contribution to important national objectives. At the same time, policymakers in both branches are faced with a persistent large federal deficit and a statutory requirement to eliminate it. These conflicting pressures give rise to concerns about the federal budget process for S&T.

The unusual circumstances of the FY 1989 budget cycle in particular drew attention to S&T in the federal budget. The Bipartisan Budget Summit Agreement concluded in November 1987 permitted only a 2 percent increase (on the order of $3 billion) above the FY 1988 level of the nondefense discretionary portion of the federal budget that finances all civilian S&T programs along with housing, health, and other domestic programs apart from entitlements such as Social Security and Medicare. In his proposed FY 1989 budget, President Reagan asked Congress to allocate the equivalent of that increase to S&T,

including initiatives certain to entail large expenditures over several years—a Superconducting Super Collider (SSC) and a civilian manned Space Station. A doubling of the budget of the National Science Foundation over five years and a project to map and sequence the human genome also were proposed.

The widely anticipated crunch in funding for civilian programs did not occur in the FY 1989 appropriations to the degree many feared. Because of a change in the FY 1988 base, Congress was able to raise the $3 billion ceiling somewhat. It approved all the President's S&T initiatives, albeit at lower spending levels or with conditions intended to postpone some decisions for the incoming Administration. Overall, Congress approved $2 billion of the requested $3 billion increase for NASA, NSF, and research programs of DOE.

As for FY 1990 and beyond, there are signs that fiscal constraints will tighten further. The deficit reduction required to meet mandated levels continues to increase. Resistance to raising taxes, curbing entitlements, and cutting defense spending is strong. Interest payments on the federal debt continue to grow. And demands to address domestic social needs will be hard to deny.

The fact remains that in recent years, under growing pressure, the Administration and Congress have quite consistently supported S&T. Witness not only the FY 1989 appropriations but also the total federal investment in research and development, now exceeding $60 billion annually by the government's accounting. [For reasons enumerated in Appendix 2, we recommend for further study the current classification of Defense Department R&D that represents a major share of the total.]

This support for S&T is based on recognition that

- Investments in S&T are essential to address a growing list of national needs and objectives, including economic development, international competitiveness, and environmental protection as well as military security and public health.
- Expanding opportunities and breakthroughs in many areas of science and engineering are likely to yield significant economic and other benefits. Examples range from biotechnology to high-temperature superconductivity.
- Certain national emergencies require support for S&T investments aimed at solutions. The most obvious current example is the AIDS epidemic; others are the *Challenger* accident and its effect on the nation's space launch capacity and the precipitous loss of market share by the U.S. semiconductor industry.
- Investments in fundamental research and the advanced training of scientists and engineers are a precondition for reaping the practical benefits of S&T, and the federal government should make a major contribution to these investments.

These views will not necessarily prevail if fiscal constraints become much tighter, but budget outcomes to date are a measure of the strength of the political support for S&T. The federal budget process has not shortchanged S&T, nor has it failed to make choices when necessary.

Nevertheless, there are two issues: First, are we investing adequately for the long term to sustain the enabling S&T infrastructure? Second, are we deciding priorities among S&T opportunities in a way that will best advance the national interest? These would be compelling issues even if the budget climate were better. In a period of limited resources, there is an even greater premium on making the best-informed budget allocations possible.

In our review, we identified three types of S&T activities that should receive increased attention in the budget process in order to address these concerns. The activities are:

- *Investments in the S&T base—training, research, and its infrastructure.* These are required to sustain all scientific and engineering research and applications. The nation's scientific productivity, technological advancement, and commercialization capacity are directly dependent on the breadth and vigor of this base. These functions are supported through the budgets of several agencies.
- *S&T activities that contribute significantly to national economic, social, and political objectives pursued by the President or Congress or both.* Examples are industrial development and competitiveness, improvement in environmental quality, prevention and treatment of disease, and enhancement of national prestige. Typically, these objectives and the supporting S&T activities are shared responsibilities of several agencies.
- *New S&T initiatives, some but not all of them capital projects, that entail large expenditures.* These are often justified in terms of multiple benefits—new knowledge, jobs, national prestige, future economic growth, social welfare, and/or security. In a tight fiscal climate, such sharp step increases in the budget are difficult to accommodate except at the expense of other programs, including ongoing S&T activities.

The current budget process, which is designed primarily to consider how each agency's S&T programs contribute to its mission, will often inadequately address needs and define S&T objectives in these cross-cutting areas.

6

A FRAMEWORK FOR ASSESSING S&T BUDGETS

Overview

We propose a framework for guiding federal S&T budget preparation and assessment that provides a perspective on policy objectives and activities across as well as within agencies. The framework includes four nonmutually exclusive categories (see Table 1):

- S&T in the context of agency missions
- The S&T base
- S&T in relation to national objectives
- Major S&T initiatives

The framework will provide a basis for administration officials and congressional committees to sort out and make more explicit the characteristics of federal S&T programs and their contributions to the nation's goals and objectives. It will help identify what S&T opportunities and deficiencies need special attention, what fields or activities are not as productive or important as they once were, and what programs could be strengthened by collaboration and less duplication among the relevant agencies.

Agency Budgets and Missions

The starting point for assessing federal S&T budgets is a judgment about the mix, level, and quality of S&T in relation to other activities that will best advance the mission of a particular agency or department. The President's budget submission to Congress, including the "Special Analysis of Research and Development," is based on agency proposals as adjusted by OMB or the President. Congress, too, is organized to consider S&T in the context of an agency's entire portfolio of activities. With a few notable exceptions (e.g., the Department of Energy and the Environmental Protection Agency), one authorization committee and one appropriations subcommittee in each House has legislative and funding responsibility for an agency's operations.

The process by which the contributions of S&T programs to agency missions are judged and resources allocated works quite well to meet mission objectives ranging from advances in weapon system capabilities and health care to technical standards development and agricultural productivity. This is attributable in part to the fact that roles and responsibilities are well defined. It is also generally agreed that this pluralistic approach to S&T budgeting has contributed to the strength of the U.S. S&T system overall. Countries with highly

TABLE 1 Framework for Assessing S&T Budgets (Categories Are Not Mutually Exclusive)

Category	Characteristics	Examples
Agency budgets and missions	Agency S&T activities viewed in term of their contributions to individual agency goals and objectives	Nuclear and alternative energy R&D in DOE Submarine acoustics in DOD Cell biology in HHS Influence on learning in DOED Plant disease resistance in USDA Fundamental research in chemistry in NSF Standards development in NIST Aeronautical research in NASA
S&T base	Activities that provide the people knowledge, and infrastructure to carry out S&T Activities supported across many agencies and under the jurisdiction of several congressional committees	Basic and applied research programs in NSF, HHS, DOD, DOE, NASA, USDA, EPA, etc. Student fellowships in DOED, NSF, HHS, DOD, DOE, NASA, etc. Equipment and instrumentation programs in HHS, DOE, NSF, USDA, NASA, DOD, etc. Facilities for research, animal care, and growing and using special materials supported by NSF, DOD, HHS, DOE, NASA, etc. K-12 materials development in NSF, DOED, NASA, etc. Student internships in federal laboratories in DOE, NIH, etc.
S&T applied to national objectives (presidential and congressional priorities)	Stated priorities of President and Congress with major S&T components Frequently supported by several agencies and within the purview of several congressional committees	Understanding and ameliorating global change in EPA, DOE, NSF, NASA, USDA, NOAA, etc. Industrial development in biotechnology, superconductivity, manufacturing technologies in HHS, DOD, Commerce, NASA, NSF, DOE, USDA, etc. Alternative sources of energy in DOE, NSF, DOD, USDA, etc. AIDS in HHS, DOED, DOD, State Dept., etc. Creation of nuclear defense (Strategic Defense Initiative [SDI] in DOD) Increase capacity for exploration of space (Space Station in NASA)
Major S&T initiatives	Significant increase (and sometimes decreases) in budgets over several years Budgetary consequences across agencies Fall in one or more of above three categories	Superconducting Super Collider (SSC) Mapping and sequencing the human genome Space Station

centralized research systems have shown growing interest in emulating our coupling of S&T support and agency missions.

Science and Technology Base

The nation's commitment to sustaining a world class S&T capacity requires investment in the S&T base, which includes undergraduate training in science and engineering; the graduate education of scientists and engineers in a research setting; the conduct of fundamental and generic applied research on the frontiers of science and engineering, primarily in universities but also in federal, nonprofit, and corporate laboratories; and procurement and maintenance of equipment and facilities required for education and academic and federal laboratory research.

These activities are supported through the budgets of several agencies that are subject to review by different parts of OMB and various congressional committees. Support of the S&T base is central to the missions of NSF and HHS, but DOD, DOE, USDA, NASA, and other agencies make significant contributions.

Any scheme for examining federal S&T budgets must recognize that the S&T base is the bedrock of the nation's ability to use science and technology in the national interest and that it requires continual replenishment.

Continuity does not imply steady funding of the same activities and institutions through the same programs and agencies year after year. On the contrary, the enterprise ought to be highly dynamic. Policymakers must be able to respond flexibly to scientific breakthroughs that suddenly transform an area of research (e.g., high-temperature superconductivity), the invention of a powerful new instrument (e.g., gene-sequencing machine) or conceptions of new facilities that would aid research and training (e.g., supercomputer centers and networks), unexpected shortages of science and engineering personnel, or changing institutional relationships (e.g., the emergence of university-industry research partnerships). And as if that were not a sufficient challenge, budget makers and analysts must be attuned to differences among a wide range of fields. Some changes affect many disciplines, others only a part of a single discipline.

Sustained attention to the S&T base should be a part of the budget process in both the Executive and Legislative Branches of government. There need not be an annual review of every aspect of the base in every field, but each aspect should be reviewed periodically and there should be a capacity for considering a few key issues in any budget year.

S&T Applied to National Objectives (Presidential and Congressional Priorities)

At any time a limited number of national issues will be on the agendas of the President and Congress. Recent experience suggests that an increasing share of them will have prominent S&T components. Current and emerging examples are industrial development and international competitiveness, dependent on advancing S&T in such fields as superconductivity, microelectronics, materials, manufacturing technologies, and biotechnology; amelioration of global environmental changes; and prevention and treatment of AIDS.

Because these are broad issues, analysis, policy formulation, program implementation, *and* the support of relevant S&T frequently are dispersed among several agencies, as illustrated in part in Table 1. In theory the formulation of S&T budgets in these areas should entail review and judgments about the respective roles of the interested agencies, the relative contribution of S&T activities in each case, and the questions to be addressed by science and engineering. Although some reviews of this kind do take place, they are not done systematically. Congress recently expressed its desire to have such reviews carried out. In the 1988 Omnibus Trade and Competitiveness Act, the President is directed to submit with his FY 1990 budget cross-cutting analyses of federal efforts to advance four industrial technologies of major competitive significance—superconducting materials, semiconductor design and manufacturing, optoelectronics, and advanced manufacturing technologies.

Major S&T Initiatives

Finally, there are S&T activities or changes in programs that entail significant increases (or, less commonly, reductions) in agency S&T budgets. Recent examples include proposals to construct a SSC, deploy a manned Space Station, and map and sequence the human genome.

Projects of this sort will fall in one or more of the above three categories and should be evaluated accordingly. Because of their size and cost, however, they also impinge upon other activities in these categories, including activities beyond their sponsoring agencies, and therefore merit additional analysis as described in the next section. It is increasingly important that future outlays for all large projects receive systematic review.

Applying the Framework

The analysis of S&T budgets in terms of their contributions to *agency missions* is reasonably thorough. It is in the three categories of activities that cut across agency boundaries that greater attention needs to be brought to bear and new information developed in the course of the budget process. The framework described above helps to construct a set of questions or tests, the answers to which can help allocate S&T resources. The questions can be used in the initial development of presidential budget priorities conveyed to departments and agencies, and they can be applied to budget proposals from their inception in agencies through their review by OMB and the President and their consideration in Congress.

S&T Base

Analyses of activities cutting across agencies that contribute to the advancement of the S&T base usually should be carried out for a discipline or broad field (e.g., physical sciences, biomedical sciences, biological sciences, engineering, social and behavioral sciences). In a coordinated process, agency budgets and programs would be examined to determine their impact on needs for

- educating science and engineering personnel
- modernizing equipment and facilities
- supporting a mix of basic and applied research
- capitalizing on promising new research opportunities
- promoting interactions between related fields of science and engineering research
- distributing research support by geographic region and type of institution
- maintaining a mix of research modes: e.g., individual investigators, large groups, centers, university-industry partnerships
- balancing competitiveness and cooperation with research programs in other countries

S&T Applied to National Objectives

Analyses of cross-agency S&T activities as they contribute to presidential and congressional programs aimed at meeting social, economic, and other objectives need to be formulated in ways that relate to specific objectives, as shown in Table 1. In general, analyses should seek to determine the adequacy of S&T budgets with respect to

- achieving specific social, economic, or other objectives
- addressing the principal unresolved S&T questions related to the objectives
- achieving the necessary coordination across agencies
- providing for both near-term and long-term results

- complementing and capitalizing on nonfederal efforts, e.g., state and private company programs

Major S&T Initiatives

The analyses of special initiatives with large budget consequences should identify how the proposed program contributes to the three previous purposes, viz., mission agency objectives; the S&T base; and social, economic, and other objectives. The analyses also should consider impacts of the program on other S&T activities. In addition, analyses might document the extent to which special initiatives will

- pursue technical breakthroughs, e.g., biotechnology and superconductivity, or important new knowledge, e.g., the SSC and mapping and sequencing the human genome;
- entail large capital investments, e.g., the SSC and the Space Station, or a collection of many, smaller-scale projects, e.g., mapping and sequencing the human genome, or other arrangements;
- provide benefits such as development of new technologies (commercial, defense, areas related to other agency missions), education of scientists and engineers, creation of jobs, and contributions to U.S. scientific and technological leadership and other global interests.

Finally, for each initiative it is necessary to specify the institutions, individuals, and organizations that will be served; the costs; the opportunities for international cooperation and cost sharing; the management structure; and the timeliness of the program (why now rather than later?).

MODIFICATIONS OF THE EXECUTIVE AND CONGRESSIONAL BUDGET PROCESSES

Putting into practice the analytical framework outlined above requires adjustments in the Executive Branch process of preparing S&T budget proposals and in the congressional process of reviewing Administration requests and appropriating funds. We do not recommend radical changes in either context. We believe, however, that current processes can be modified to yield better results.

Executive Branch

The purpose of our recommendations is to ensure that Administration budget proposals reflect reviews not only of agency needs but also of the needs of the S&T base, the requirements of presidential and congressional policy initiatives that depend on S&T activities, and the objectives and impacts of major S&T initiatives. We propose that the Administration's development of the budget include two new features.

- Early in the budget cycle, the President should provide the agencies and departments with specific guidance on his S&T priorities in cross-cutting areas and on major S&T initiatives.
- Agency budget submissions should be developed, analyzed and adjusted in terms of this initial guidance and the questions posed in the preceding discussion of the framework.

We believe that the President's science and technology adviser, working closely with the director and professional staff of OMB, is best suited to coordinate both phases of this process. The additional procedures would not alter the traditional prerogatives of department secretaries and agency heads in formulating S&T programs and budgets in the context of agency missions, nor would they detract from the role of OMB in managing the preparation of the President's budget. On the other hand, our proposals would take advantage of the considerable scientific and technical expertise in both the agencies and OMB. They might require new coordinating mechanisms, although one already available under law is the Federal Coordinating Council for Science, Engineering, and Technology.

More specifically, the process might work as follows:

Being familiar with the President's general policy objectives and having consulted regularly with senior S&T and budget officials of the government, industrial officers, academic scientists and engineers, and professional societies, the science and technology adviser would develop recommendations on cross-cutting S&T priorities for the forthcoming fiscal year budget. With the President's modifications and endorsement, the recommendations would become part of OMB's initial instructions to the agencies. Examples of priorities that might be stated in these instructions are support of graduate training in the physical sciences and engineering, advancement of generic manufacturing technologies, research and monitoring to narrow the uncertainties regarding global climate change, and initial exploration of long-range applications of high-temperature superconductors. The President's statement of priorities would then become part of the criteria for evaluating agency budget submissions.

We also propose that the Administration submit to Congress with its budget recommendations a policy statement presenting the President's cross-cutting priorities for S&T that guided the preparation of his budget. It would include a summary of agencies' mission-related S&T activities as currently presented in the "Special Analysis of the Budget for R&D." The statement would also emphasize the Administration's proposals dealing with the S&T base, social, economic or other national objectives, or major new S&T initiatives.

Following enactment of necessary authorizations and appropriations, the President's science and technology adviser, director of OMB, and agency heads would work together to see that programs are carried out in accordance with the President's priorities as modified by Congress.

Table 2 shows the additional steps that we recommend alongside the sequence of steps now followed in the formulation of the President's budget.

Congress

If the President's budget presentation conforms to the recommendations above, Congress will have more information than it currently receives to evaluate the President's S&T priorities and budget allocations across agencies. Complementary adjustments in the congressional budget process could facilitate consideration of cross-cutting S&T programs and initiatives in the same manner as the recommended changes on the executive branch side. We make two procedural recommendations. We describe other options, suggested by members of Congress, that would affect consideration of S&T but arise from broad concerns about the effectiveness of Congress.

- Congress, no less than the administration, should consider programs and budgets in relation to the S&T base, national policy objectives, and major S&T budget initiatives as well as in the context of individual agency missions. This review should begin before the budget is disaggregated for consideration agency by agency and program by program. It is therefore an appropriate function of the budget committees of the Senate and House and of the authorizing committees with broad S&T oversight jurisdiction—the Senate Committee on Commerce, Science, and Transportation and the House Committee on Science, Space, and Technology.

  In each house a full committee or its special task force on S&T should examine the President's S&T budget submission; request whatever staff or support agency studies are needed to supplement analysis available from the Executive Branch; and take testimony from the President's science and technology adviser, agency officials, and knowledgeable people in the academic and industrial communities. We note that in recent years the Senate Budget Committee has conducted annual overview hearings on S&T in the federal budget. In the House, the Science, Space, and Technology Committee conducts annual S&T "posture" hearings.

TABLE 2 Current Practice and Proposed Additions to the Executive Branch Process for Preparing S&T Budgets

Current Practice		Proposed Additions	
1.	Focus is on how S&T activities meet the requirements of the missions of individual agencies	1.	Add perspective of major initiatives and S&T activities that have impacts across several agencies
2.	OMB manages preparation of President's budget	2.	None
3.	Cabinet secretaries and agency heads play key roles in formulating S&T programs and budgets to meet agency requirements	3.	In addition, President's science and technology adviser, working with OMB, coordinates process to bring the cross-cutting perspective of S&T activities and major initiatives into the budget preparation by agency heads
4.	OMB initiates process by sending agencies instructions for preparing their budgets	4.	In addition to the types of instructions issued currently, the initial guidance includes the President's cross-cutting S&T priorities
5.	OMB reviews and adjusts agency budget submissions and recommends final budgets to the President, with opportunities for agency appeals	5.	The President's cross-cutting S&T priorities are used, along with other criteria, in reviewing agency budget submissions and recommending final decisions
6.	President submits budget proposal to Congress; a special analysis on R&D is included that presents a summary of agency R&D budgets	6.	The President's budget submission includes a statement of the S&T priorities that guided budget preparation, the rationale underlying them, and the resulting budget proposals

Whatever method of review is chosen, the budget committees should, in connection with the Budget Resolution, report their judgments on the President's priorities and recommend changes. The committees' recommendations would not dictate subsequent decisions in the congressional budget process; but they could influence allocations made within the appropriations committees, especially if the budget committees were to track the appropriations and report periodically on how they compare with the President's request and their own recommended adjustments.

- The appropriations committees also should have a procedure for reviewing cross-cutting S&T activities in light of the President's priorities and the budget committees' recommended adjustments. At a minimum, there should be discussions among the committee chairman and ranking minority member and the appropriate subcommittee chairs and their ranking members; and these discussions should begin before the appropriations committees allocate spending authority to their respective subcommittees (the 302b allocations).

Many members of Congress have proposed major changes of congressional budget procedure and committee structure that may receive serious consideration in a future Congress. One such procedural change is for the budget committees to propose, and both houses to approve as part of the Budget Resolution, the 302b allocations, which would then be binding on the appropriations committees. Proposed structural changes include placing on the budget committees more chairmen and ranking members of the appropriations subcommittees and authorization committees, creating a joint budget committee, consolidating the authorization and appropriations committees, and revising the jurisdictions of the appropriations subcommittees to combine similar programs and agencies.

We recognize that changes of this scope will only be adopted, if at all, out of broad concern for improving the performance of Congress in its legislative, budget, and oversight functions and after full consideration of the demands on members' time, their constituency and policy interests, and the distribution of influence among members and committees. But we urge Congress to consider also how procedural or structural changes would affect the review of S&T programs and budgets. In general, we favor a continuous process in which the early cross-cutting reviews of the President's S&T budget priorities would carry weight in the appropriations phase. If either house revises its committees' jurisdictions, we favor combining S&T programs with their parent agencies where possible. The budgets for S&T activities are now too large and their bearing on national affairs too great to be treated in an uncoordinated fashion.

Finally, there appears to be growing support for the government to shift from an annual to a two-year budget cycle. Indeed, the President's FY 1989 budget proposes two-year appropriations for a number of agencies. Although we have not considered how this should be accomplished in practice, we support biennial budgeting in principle. It could benefit longer-term federal investments such as S&T expenditures by enabling program managers to plan their S&T activities over a longer period, by giving S&T performers somewhat greater assurance of stable funding, and by encouraging decisionmakers to be more realistic about out-year spending requirements especially for major projects. A two-year cycle might also make it easier to accomplish the additional steps we propose in the development and review of the President's S&T budgets.

In recent Congresses, there has been a movement toward multiyear authorizations for agencies and programs with S&T components. If Congress decides to experiment with biennial appropriations, we believe that S&T programs should be leading candidates for such a trial.

CONCLUSION

In preparing and evaluating federal budgets for S&T, it is time to institutionalize a cross-agency perspective on three categories of activities: those contributing to the S&T base, those contributing to broader national policy objectives identified by the President and/or Congress, and those representing major new initiatives. These are activities undertaken by several agencies or with budget consequences for several agencies. Political support for such activities continues to grow, but none of the categories receives adequate attention in a budget process designed to consider S&T programs almost exclusively in relation to the mission of the parent agencies.

The Academies and the IOM examined several approaches to conducting cross-agency reviews of S&T programs in the budget process. We recommend an expanded framework for assessing and adjusting S&T programs across all agencies and procedural changes to apply the framework in both the Executive and Legislative Branches. The analytical framework should be useful immediately to officials involved in the budget process. The procedural changes can and should be implemented beginning with the FY 1991 budget cycle.

The National Academies of Sciences and Engineering and the Institute of Medicine hope to remain active participants in efforts to improve federal budgeting for S&T and will continue to promote discussion of these issues within the science and engineering community.

APPENDIX 1

Excerpt from the Report of the Committee on the Budget, U.S. Senate, on S. Con. Res. 113, Concurrent Resolution on the Budget FY 1989 (Sen. Report. 100-311)

Science and technology programs are widely recognized as being key to the nation's response to the challenge of economic competitiveness, as well as other major national priorities, such as health, environment, national defense, and quality of life.

Funding for these programs is spread across more than thirty independent federal agencies, making it difficult to develop a coordinated national research and development budget. Annual analyses performed by the Office of Management and Budget and the National Science Foundation merely compile agency proposals and are retrospective in nature. They generally are not used in the Executive branch decision-making process.

The Committee held hearings this year on science and technology. Much of the discussion centered on the problems and lost opportunities associated with the lack of coordination and the need for a better way to examine funding and organizational priorities in the federal effort in science and technology.

In light of these hearings and other findings, the Committee believes that the nation needs to develop a comprehensive set of mission categories to examine the allocation of resources to science and technology and identify gaps in funding. Any such approach should include substantial involvement from the scientific community in establishing priorities within the federal effort in research and development.

To undertake this effort, the Committee believes that the National Academy of Sciences, acting jointly with the National Academy of Engineering and the Institute of Medicine, should provide advice on developing an appropriate institutional framework and information base for conducting cross-program development and review of the nation's research and development programs. This should be structured in such a way that it can be used by both the Executive branch and Congress as a method for reviewing program contents and strategies and in determining funding and organizational priorities for science and technology. The Academies' advice should be provided to the appropriate Committees of Congress not later than November 15, 1988.

APPENDIX 2

Recommendation to Study Classification of DOD Activities in Federal R&D Statistics

Historically, DOD has accounted for a majority of federal R&D spending—currently, nearly two-thirds, or approximately $39 billion. Of this amount, between $4.5 billion and $5.5 billion are for activities similar to civilian agency S&T activities—basic and applied research and exploratory development. More than $30 billion are for advanced technology and military equipment development, testing and evaluation, and the operation of facilities for these specialized purposes—activities that are critical to the DOD but not comparable to other federal S&T activities. In the military budget buildup since the late 1970s, moreover, the latter budget categories have grown more rapidly than the former ones.

Lumping together as R&D the defense and civilian agency activities now classified as such may lead to overstating the national S&T effort overall and in certain research fields. We therefore urge the new Administration to assemble a group of experts to examine what DOD activities are appropriately classified as R&D. The group should include people with experience in OMB, the Office of Science and Technology Policy (OSTP), and DOD R&D management.

COMMITTEE OF COUNCILORS

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ACADEMY STAFF GROUP

DAVID L. BODDE is Executive Director of the Commission on Engineering and Technical Systems. Prior to joining the National Research Council, Dr. Bodde was Assistant Director of the Congressional Budget Office and a Deputy Assistant Secretary of the Department of Energy. A graduate of the U.S. Military Academy, his graduate education includes nuclear engineering at MIT and business and economics at the Harvard Business School.

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LAWRENCE E. McCRAY, Executive Director, Committee on Science, Engineering, and Public Policy, received his doctorate from MIT in the field of science policy studies. In addition to his work on the effects of the Gramm-Rudman-Hollings Act and other assignments in science policy at the National Research Council, Dr. McCray has worked at the Office of Management and Budget and elsewhere in the Executive Office of the President.

STEPHEN A. MERRILL, Associate Project Director, is Director of the Office of Government Affairs of the National Research Council. He has participated in several Academy studies of science policy and technology and international competition. Dr. Merrill has served on various congressional staffs, most recently that of the Senate Committee on Commerce, Science, and Transportation. He was a member of the Senate staff group that developed the Senate committee reorganization plan adopted in 1977.

NORMAN METZGER is Deputy Executive Officer of the National Research Council and has been responsible for a number of examinations of science and its support. These include guidelines for the science and technology centers of the National Science Foundation; a series of reports on the outlook for science and technology; and a workshop on federal research and development support, emphasizing the relative costs and benefits of that support.

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PHILIP M. SMITH, Executive Officer of the National Research Council and National Academy of Sciences, has had broad science policy experience in the federal government. Former positions include Executive Assistant to the Director, National Science Foundation, and to the Science Adviser to the President; and Associate Director, Office of Science and Technology Policy, Executive Office of the President. He was Chief of the General Science Branch of the Office of Managment and Budget and has directed polar research programs of the National Science Foundation.

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Chairman SASSER. Now we will turn to Dr. Rosenzweig.

STATEMENT OF DR. ROBERT M. ROSENZWEIG, PRESIDENT, ASSOCIATION OF AMERICAN UNIVERSITIES

Dr. ROSENZWEIG. Thank you, Mr. Chairman, Senator Hollings.

My name is Robert Rosenzweig, and I am president of the Association of American Universities, a group consisting of 56 American and two Canadian universities, each with a strong commitment to high quality research and doctoral level education as part of its fundamental mission. Thus, they have individually and collectively a strong interest in policies that affect the Nation's ability to produce good research and to educate the people who are capable of doing it. Particularly important to us are those policies that govern the way in which resources are allocated for the support of research and research training.

Given that background, it is easy to see why the members of AAU were so pleased when the National Academy of Sciences was asked in last year's budget resolution to study the problems of setting budget priorities in science and technology and to report on ways to approach that always difficult job.

Chairman SASSER. Dr. Rosenzweig, we will be pleased to hear your entire statement, or feel free to summarize it, if you wish.

Dr. ROSENZWEIG. Thank you, Mr. Chairman.

Let me describe the nature of the problem, although I am sure it is clear to you. There is more important work in science and technology ready to be done than ever before in history, but the Nation's fiscal condition makes it extremely unlikely that the Federal Government—the main supporter of basic and applied research—will be able to fund all of the work that deserves support. Not only is that situation difficult to deal with purely as an intellectual problem, but within the scientific community, the process of trying to deal with it is inevitably divisive among people who are not otherwise natural adversaries.

As a result, the scientific and academic communities, like Scarlett O'Hara, have largely avoided thinking about the problem, hoping that tomorrow will be better. It is now clear that tomorrow is a long way away, but the problem is with us today. Thus, the academy report, which is, to my knowledge, the first serious effort by leaders of the scientific community to address the question as both long overdue and doubly welcome.

I want to talk this morning, Mr. Chairman, about two main points: first, the recommendations of the academy report; and, second, an underlying issue that I believe we can no longer responsibly avoid—namely, how large a research establishment can we afford?

First, the academy report. It strikes me that the central fact about setting priorities is that when the public's money is involved, public bodies do the setting. There are, of course, even within that basic fact, better and worse ways to do the job, and that is the issue that the academy report quite properly focuses on—how to do it better. It strikes me that the advice it gives is sensible.

Fundamentally, the system that has grown to support science and technology is sound. Most of the Federal money for science is rooted in agency missions, and that is a condition that supplies reality checks on the relevance of the work, as well as bureaucratic and political support, which help to ensure a measure of continuity. Basic, nonmission-related work is supported by the National Science Foundation, by important programs of NIH and ADAMHA, and by some mission agencies.

Quality control across the system has been effected through competition and by a surprisingly consistent adherence to the practice of merit review by qualified scientists. It is a system that has worked best when lubricated by adequate funds, but it is not one that is designed to force crosscutting comparisons of value that decisionmaking in conditions of scarcity requires. That weakness of the system in the executive branch is exaggerated still further by the mirroring division of responsibilities among the authorizing and appropriating committees of the Congress.

The fact is that there has been little incentive for administrations, the Congress, or scientific interests to learn how to do it better, so long as there has been a reasonable expectation that there would be enough money each year to keep everyone whole and expand a little in the bargain. That is no longer the case, and so changes must be made. A greater degree of order needs to be brought to the process—not neatness or tidiness, which are unreasonable expectations, but a bit more order and discipline.

In my view, the first requirement toward that end is the creation of a strong science policy capacity in the office of the President. The President's science adviser must be a respected and effective figure, backed by a strong staff and an advisory apparatus that taps the knowledge of leading individuals in the range of fields most relevant to the Government's interests.

Such a person, seen to have the confidence of the President and also to play an important role in budgetmaking, would be able to bring the scientific community to the table for real discussions about what work is likely to be most important and valuable. Even more important, absent that kind of force near the center of the process, it is hard to see how credible judgments about major initiatives will be made. And it is equally hard to see how so formidable and critical a task as shifting the Government's emphasis away from military and toward civilian R&D can be accomplished.

Moreover, I believe it is as much in the interests of the Congress as it is of the President that those judgments be well made and clearly articulated before they arrive on the Hill, and that they be cogently argued thereafter. The Congress, reflecting the dispersal of program responsibility throughout the Government, is not organized to deal with science in anything like an orderly way, and I see no prospect that fundamental reorganization for that purpose is in the offing. Therefore, so long as the budgets of NSF and NASA will be competing in the same Appropriations Subcommittee with housing and veterans programs, and so long as NIH will be competing with education, it is essential that the numbers that come to you emerge from a process in which you have confidence. The academy report has suggested a way for the Budget Committees, at least, to take a broader view of the S&T budget than they have done in the past, and those suggestions seem to me to make good sense.

The academy has also suggested some substantive categories for evaluating science expenditures and has identified three main ones that need close attention. I list those; they are already before you.

The debate over S&T funding is really a debate over the weight each of those categories deserves. In my view, at the present time, the first of them—investing in the science and technology base—is of overriding importance, and I think I could make a plausible argument for that position. Others may have other views, and they, too, should be put to the test of justifying their preference. An annual debate that began on such lines would, I am confident, produce better results than the program-by-program or project-by-project debates that we have grown accustomed to. In putting forward those categories, the Academy has given us the framework for a more orderly consideration of science policy and science funding priorities.

Let me turn now, Mr. Chairman, to the second of the questions I want to address: The growth of the research enterprise, past and future.

In the last 40 years, there has grown up in the United States a research enterprise of unparalleled and unprecedented richness and productivity. I use the word "grown" advisedly, because one of the outstanding features of that history is the growth in the number of persons practicing science and technology and the number of organizations in which the practice takes place. Leaving aside the corporate sector, scientific activity is funded by the Government, among others, at universities, independent laboratories, Government-owned and managed laboratories, Government-owned and university-managed laboratories, museums, and a variety of other kinds of organizations. Many of these did not exist before World War II, and many of them that did exist—for example, the universities—had only the most rudimentary research activity.

It is often argued that our research system is dominated by a small number of institutions that claim and defend a disproportionate share of the resources. It should be noted, however, that a large number of institutions, surely more than 100 universities, are major performers of research, and well over half of those were not when the period of expansion began.

An even less well-known truth is that the identity of the top recipients of Federal research funds does change over time. According to a report from the General Accounting Office, four universities that were not among the top 20 recipients in 1967 made the top 20 in 1984. Seven made it into the top 50, and 19 reached the top 100. In each case, of course, a like number lost their place. In a system in which one would not expect or want large, sudden swings in funding patterns, that record seems to me powerful evidence that there has been and remains room at the top.

Still, as legislators know better than almost anybody, growth is the best of all possible conditions. What we are considerably less sure of is how to deal with new claimants for resources when there is a conflict between their claims and those of existing performers. That seems to me to be a fair description of recent years with respect to civilian R&D and the most likely prediction for the near future. Let me suggest two guidelines for use in such circumstances:

First, the national interest demands that there be no substitute for quality, measured as best we are able to do it, when decisions are made about spending for science and technology. Other criteria might be appropriate to final decisions, but they must always be secondary to judgments about quality, and they must not replace those judgments.

Second, neither existing performers of research nor those who wish to join the circle are entitled by right to the public's support. Only quality should provide the ticket of admission.

Now, I realize that this argument, coming from me in the position I hold, can be dismissed as mere self-interest, a thinly veiled justification for protecting the haves and keeping the have-nots at bay. Quite the contrary, though, it is an argument for funding as much good science as the Nation can afford and for funding it wherever it is being done. Nor is this view inconsistent with support for such programs as the National Science Foundation's excellent EPSCOR program, which is designed to help make States and their universities competitive for NSF funds based on merit. The purpose of my guidelines is not to close the door to quality but to open it wherever it exists and support it to the extent of available resources. What the guidelines will not support is the view, grown more common in both Government and academic circles, that the primary role of the Federal Government is to spread the available funds to all institutions and laboratories in which research is conducted or planned.

The consequences of the latter approach to science funding have become all too clear. Let me mention a few of the most obvious and troubling.

First, some national laboratories have come to occupy the same status as military bases, justified not for what they do to advance a mission, but for what they contribute to the local economy. I go on to quote a statement by David Packard, as chairman of a committee of the White House Science Council that studied the national laboratories in 1982 and 1983. "The size of the laboratory," he concluded, "must be determined by its mission requirements and by the quality of its work."

I doubt that we can afford to continue the old ways. We appear to have found a way to evaluate the usefulness of military bases to the defense mission and to close some where that is indicated. A similar system is required for national labs. Many of them are doing first-class work by any standard, but others are not. We could strengthen the former and strengthen the whole research system in the bargain by finding ways to phase out the latter.

Second, the Federal Government stopped investing in university laboratory facilities in the late 1960's. The result has been a predictable deterioration of the existing capital stock. The pressure caused thereby, combined with the growing belief that research provides local economic benefits, has led to an explosion of special-purpose earmarks in appropriations bills for individual facilities without regard to the quality of the work that would be done in the facilities, or to the way they fit with the mission of any agency, and with no opportunity for comparative assessments of value. One recent estimate put the amount of those earmarks in fiscal year 1989 at more than $200 million, an amount larger than the fiscal year 1990 authorization for the new facilities renovation program at NSF.

I know that this practice does not add up to good national science policy, and I am not even certain that in the end it will prove to be very good politics. Of course, some good things will be done with this money, but it is far from the systematic approach that we need to address the serious problem of a deteriorating research infrastructure, and in such a tight budget climate, the uncritical expenditure of such large sums of money must be at odds with better ways to do the job. Spending that same amount in a program using quality-based judgments would produce better results for science and technology and could also better reward local and State investments of initiative, energy, and money.

Third, and finally, Mr. Chairman, the internal and external pressures on academic leaders to aim toward a large research mission not only feed the pressures on research funding, but they distort institutional missions by exaggerating the value of research at the expense of undergraduate education. Research is expensive, not only in money, but in the time and attention of the faculty who do it. Their commitments are to funding and doing their research, to teaching the graduate students who help them do it, and, as can easily happen, only then to the undergraduates in their classes. Indeed, as research becomes more important, teaching can become less so, and faculty can disappear from the classroom entirely to be replaced by their graduate students.

There are genuine compensations. The opportunity to study with teachers who are themselves functioning at the outer limits of what is known as perhaps the most exhilarating of all educational experiences. But one has the feeling that in too many cases, we are losing the potential for genuinely good undergraduate education and receiving in return research and graduate education of lesser quality.

Finally, lest I be perceived again as lecturing to those who have not in order to protect those who have, let me be clear that established research institutions also need to look hard at their missions, and the balance among them. Hard times can teach valuable lessons. Indeed, as I watch the university scene, I already see more awareness that it is a serious error for any institution, no matter how eminent it might be, to try to do everything, to try to be all things tc all people. A number of institutions have looked hard at what they do best and have determined to focus their energies on those programs, even if that means cutting back or closing others. That determination needs to spread in the academic world, just as it needs to inform the programs of Government.

As that spirit grows, quality becomes more important. In respect to intellectual work, only the primacy of quality can guarantee genuine equity—equity that is defined by access to funding based on the merits of the work to be done. This Nation needs and can afford to support all of the first-class scientific work it is capable of doing, but only if it is not required to support more.

Thank you, Mr. Chairman.

Chairman Sasser. Thank you, Dr. Rosenzweig.

We have been joined by our distinguished ranking member, Senator Domenici. I also want to welcome Mr. Prestowitz to our panel here this morning.

I want to turn now to Senator Domenici for any statement he might wish to make.

OPENING STATEMENT OF SENATOR DOMENICI

Senator DOMENICI. Thank you, Mr. Chairman. I would ask that my written statement be made a part of the record, and I would just say to Dr. Press, with reference to the national academy, I compliment you. I note in your remarks, which I was not privileged to hear but read, that you are satisfied with the progress to this point in that the executive branch has had a rather in-depth audience with you, with reference to the recommendations, both budgetary and otherwise, and that a few steps have been taken.

I want to say, Mr. Chairman, that I was privy to making arrangements for them because I felt very strongly that the new budget director ought to get the insight with reference to budget information. I did sit in one meeting with them, and I was very optimistic that they are going to coordinate with the science adviser in the future and attempt some of the budgetary information that the academy has recommended. I compliment you for that, and I hope you will count on many of us to continue to try to do a better assessing of what we are spending money on and what we should not be spending on, but get a better glimpse of what we are doing in the budget document.

Having said that, I want to say to Dr. Rosenzweig, I did not get a chance to read your statement. I was here to hear it, and I do not intend to be argumentative. But I do believe that if you are going to approach the national laboratories and the Federal Government's effort in a cavalier manner, that since we know how to close military bases, we ought to know how to close them. It appears to me that I would accept that if you, as an academician, were willing to say we can approach with the same cavalier manner the universities of this country. And I am fond of them. I am their friend. But they are paid for by taxpayers, too, for the most part, maybe not the Federal Government.

It seems to me that if you want to approach it that way, you ought to recommend that you set up such a commission to decide which universities are doing duplicitous work. There are many; you would admit that. There are many, if you are talking about mission-oriented and quality, that are not. Yet we have assumed in our country we can afford it all, because as you indicated, we certainly did well with that for the first 40, 50 years of this American industrial prosperity.

With that, I would merely suggest that it is not as simple to decide what the mission of a laboratory with 9,000 scientists and engineers is. They have a great deal of quality beyond the mission. I think it deserves being looked at from the standpoint of what can they do because of their talent that has a synergistic effect rather than say maybe we do not need them because the nuclear mission is diminishing, or some other aspect that put together this great talent.

Thank you very much, Mr. Chairman.

Chairman SASSER. Thank you, Senator Domenici.

[The prepared statement of Senator Domenici follows:]

STATEMENT OF
SENATOR PETE V. DOMENICI
ON SCIENCE AND TECHNOLOGY POLICY
SENATE BUDGET COMMITTEE HEARING
MARCH 9, 1989 -- 10:00 A.M.

Let me join you, Mr. Chairman, in welcoming our distinguished witnesses. I appreciate your interest in holding this hearing, Mr. Chairman, as there is no doubt in my mind that America's economic future is tied to finding ways to capitalize more effectively on our scientific and technological resources.

This past January I met with OMB Director Richard Darman and Dr. Press to discuss the Academy's report on setting budget priorities in science and technology. At that meeting, I was encouraged by the OMB Director's support of science programs and of cross-cutting analysis that will help us better understand and coordinate federal science policy across all the agencies.

It is clear to me that President Bush's budget makes a strong commitment to funding and supporting science and technology. Of $8 billion in initiatives his budget proposes for domestic discretionary programs, nearly $3 billion -- or 36 percent -- of the increases go for science programs at the Department of Energy, NSF, and NASA.

To support of R & D and economic competitiveness, the Bush budget also proposes changes on the revenue side of the budget: cutting the capital gains tax, making permanent the R & D tax credit, modifying R & E expense allocation rules. We should evaluate these proposed changes in the tax code on the basis of their contribution to our long-term economic competitiveness, instead of just the amount of increase or decrease in tax revenues.

As the National Academy of Sciences report notes, Congress also must do a better job of coordinating and evaluating science policy. Scientific and R & D programs are dealt with by Congress much as we handle the homeless or anti-drug abuse programs: nearly every committee of Congress, and hundreds of bright and energetic staffers, push this or that program, without much attention paid to what every other committee is doing.

In the Appropriations Committee alone, nine subcommittees provide funds for civilian R & D programs. And this does not even count the research spending in the defense budget.

But improved coordination in our federal science policies is not enough. We must also fully utilize the scientific resources we already have and find ways to transfer knowledge and expertise between agencies and between the public and private sector.

For example, the Department of Energy's national laboratories contain 22,000 scientists. They are among the finest research institutions in the world. I am quite familiar with the quality of these laboratories work as two of them, Sandia and Los Alamos are in my state of New Mexico. Mr. Chairman, I would also note that your state has a similar outstanding scientific resource in the Oak Ridge National Laboratory.

We need to create a synergy between the expertise in these national resources and the private sector. It is not enough for the U.S. to be the world's technological leader. We must overcome the barriers that prevent industry taking scientific knowledge and turning it into products that further our economic competitiveness. I am absolutely convinced that our economic future, in relation to the rest of the world, depends on this.

Mr. Chairman, I look forward the hearing the testimony of the witnesses.

Chairman **Sasser**. Mr. Prestowitz, we will be pleased to hear from you now.

STATEMENT OF CLYDE V. PRESTOWITZ, JR., AUTHOR, "TRADING PLACES: HOW WE ALLOWED JAPAN TO TAKE THE LEAD"

Mr. **Prestowitz**. Thank you, Mr. Chairman. I will keep my remarks brief.

I would like to make two or three points. I think a couple of them may have been made before.

We spend about the same percentage of GNP on research and development as the leading competitive nations, Germany and Japan. We do not get the same bang for those bucks that our competitors get. One of the major reasons for that is I think described on this chart behind me.

The tremendous emphasis and influence of the Defense Department and our defense establishment on research developments is a tremendous drag on our ability to get fruits from that investment.

In the past, it was the case that defense technology led consumer technology. Today, it is the case that, in general, consumer technology leads defense technology. The semiconductor chips that are going into our weapons systems are two and three generations behind those that your kids have for their Nintendo games.

The fact that we are pouring half or more of our total research dollars into defense projects which are not conceived of with a commercial objective, which are increasingly arcane and specialized, means that in real terms we are spending about half of what our leading competitors are spending on research and development.

Beyond that, I would suggest that—this is somewhat heretical, but I believe we put too much emphasis on the "R" in R&D and not enough emphasis on the "D." We tend to respond to any comment or discussion of research and development with the view that the proper role of the Government is to encourage basic research. That is safe because it does not involve the Government in intervention in any industrial policy or any way in the economy, and so we like basic research.

Of course, there has to be basic research. But the interesting thing is that our competitors—again, Germany and Japan—do not put that emphasis on basic research that we put on basic research. They put much more emphasis on the "D."

One of the problems with focusing only on the "R" side of it is that it is undirected and unfocused. In fact, if you look at our research and development establishment in the U.S. Government, it is a hodgepodge. You have got DARPA in the Defense Department. You have got other agencies in the Defense Department. You have got NASA. You have got the Bureau of Standards and the Commerce Department. You have got the Energy Department handling all the national labs. You have got the Transportation Department. It is scattered all over the lot.

The President's science adviser has virtually no influence in the White House or in the U.S. Government.

Chairman **Sasser**. There is no science adviser there, Mr. Prestowitz.

Mr. PRESTOWITZ. Well, the Office of the President's Science Adviser, excuse me. I was not referring to the person.

It has no influence precisely because it is an adviser. Unless you have people who are in the line bearing responsibility, they are not going to have a lot of influence.

One of the suggestions that I think might be considered is a greater emphasis in our Government policies on development, and in looking at development, that means the giving of an orientation. So that the national laboratories, when they conceive of projects, conceive of them in terms of what might ultimately come out of these projects.

I would suggest that consideration be given to the establishment of a Department of Science and Technology, that department to include the Defense Advanced Research Projects Agency, NASA, the Energy Department, the Commerce Department, the Office of the President's Science Adviser, and other appendages in the U.S. Government scientific establishment.

We also have the question of transfer of technology. The Japanese fighter, the FSX, has become a hot issue recently. It is a hot issue because here is a situation in which we have spent billions of dollars in research and development, and as a result of that, we have become the world's leader in the aircraft industry. Yet in this case and in other cases, we are proposing to transfer that technology at minimal or no cost for objectives that are relatively short term and not even optimal from a defense point of view.

This, again, is characteristic of the schizophrenic attitude that we take towards research and development. A more "D" oriented program would include in it review of those kinds of transfers.

Finally, let me comment a little bit on the market situation. One of the reasons that we do not get what we would like to get from R&D is not because we are flawed in our research or our development. It is because of the situation that pertains in our markets. Let me give you an example.

Between 1985 and 1987, the Japanese semiconductor industry had cumulative losses of $4 billion. In that same period, the American industry had losses of $2 billion. In the United States, five companies left the business altogether. Thirty thousand people lost their jobs. R&D budgets were cut to the bone. Capital spending was drastically cut back. The share prices of all the companies dropped.

In Japan, a $4 billion loss, no company went out of the business. No worker lost his job. R&D spending was expanded. The share prices of all the companies went up.

The reason that we do not have a consumer electronics sector, the reason that we do not do research and development in consumer electronics is not because our companies are not capable of it, not because we have not spent enough on basic research in this country; it is because we allowed a situation to develop in which a cartel of Japanese companies colluded to dominate the American market.

I do not say that flippantly. This cartel was discovered by Japan's own Fair Trade Commission and was convicted of price-fixing and collusion, by the Japanese.

Now, I submit that unless you have a science and technology policy which is coordinated with and takes into consideration the problems in the marketplace, and is coordinated with trade policy and other domestic economic policies, all the money you spend on R&D is money down the rathole.

Thank you very much.

Chairman SASSER. Thank you, Mr. Prestowitz. Before you got here, we exhibited a chart which indicated a reversal in market share of semiconductors. [Chart 1, p. 2.]

You might put that up. You can see it behind you. It indicates what has happened. I know you are well familiar with that.

I am going to yield my turn in questioning here to Senator Hollings, who has another hearing I think he must chair. I will turn now to Senator Hollings.

Senator HOLLINGS. Thank you very much, Mr. Chairman and Senator Domenici for yielding.

I had no particular questions. I wanted to hear these important witnesses with respect, Mr. Prestowitz, to the technology transfer, its development and everything else. In our master trade bill it was not debated, Senator Domenici. I wish it had been opposed. We got 98 votes for it. We resolved our Bureau of Standards into an Institute of Standards and Technology. We thereupon appointed and there has been appointed the Under Secretary of Technology in that Commerce Department.

We set up three centers. We actually authorized 12. And under peer review, we have already rewarded three, and then provided for small loans to small entities to help commercialize and catch up, so to speak, with the competition in Germany and Japan, and also help those kind of complex entities, like Computer 5 that Adm. Robert Inman has out there in Austin, TX.

We are beginning now to react, and I just wanted to hear, Mr. Prestowitz, your comment on that so far. It is insufficient. It needs, as you have testified, a Department of Science and Technology. Heavens above, you and I will be dead and gone. There is no chance. I mean, we might as well testify to some, you know, realities and possibilities. Government is the art of the possible. So if we got that one, we would really debate it, and nothing would ever happen.

In that light, tell us how, since we cannot get a whole Department of Science and Technology—and I will ask Dr. Press and Dr. Rosenzweig, I will just give you one. We have got a mission to planet Earth. Everybody's attention is on the global warming, the hole in the ozone layer. Margaret Thatcher had 123 countries last weekend in London. And in the Congress, we have a bill with overwhelming cosponsorship for that Federal coordinating commission at the White House to start giving us an annual report and plan.

But when we get down to running, the geological survey has a part of this, National Oceanic and Atmosphere, the oceans crowd, NASA, the Space Administration. Everyone, the volcanic folks and otherwise, the ground as well as the space.

Now, we learn with the attempt to rescue our hostages in Tehran where the Army had one, the Air Force, the Navy, the Marines had its part, it was a total abort. And there is no education in the second kick of a mule.

How do we get somebody to head this mission to planet Earth? Who is going to head it up? And do not give me the roles. You all can babble that. I mean, that is rhetoric. We know all of that. I have heard ad nauseam, coming out our ears, "This has got to be, that has got to be, the universe has got to." I want to know from your experience, Dr. Press, who is going to head it up? You have been the science adviser at the National Science Foundation. You do not have a particular prejudice, and you know yours, the Science Foundation in research cannot. So you would be a good one. Who can head it up?

Dr. PRESS. I agree with you that a major problem we face in Government in an area as important as planet Earth is the multiple authorities across many different agencies. That has been our weakness. Without giving it more thought, I do not want to say here which should be the lead agency. But I do want to say that there are better ways of coordinating these programs across all of the agencies.

If our recommendations on the budget process were followed, we would know in advance what our priority is with respect to planet Earth. In instructions that go out to the agencies the President would say: I want to emphasize in this next budget the global environmental issues, Project Planet Earth, and I want to see this reflected in each agency budget, and I want my science adviser to coordinate it all by convening all of the principal science offices in NOAA, NASA, the Department of Interior, the U.S. Geological Survey and so on.

Among themselves, they would decide on a lead agency that would take the responsibility for shepherding all of this through Congress.

Senator HOLLINGS. What is the difference between that and the Office of Management and Budget. That is exactly what the President is supposed to be doing at that particular point in Government right this minute, in the executive branch.

Dr. PRESS. If the President follows through and raises the level of authority and responsibility of his science adviser, I think it will be a different situation.

Senator HOLLINGS. Oh, that is true. It is up to the particular President. Take the last one. He said get rid of domestic programs and let us heighten defense. And we did, through his OMB. So we have got the entity right there doing it. And if you get in a science President, you will have what you want. Or maybe not, they say because this fellow Sununu is a scientist, no one else wants to work with him.

I do not know. But, I mean, we got what you are asking for. I mean, we have got that. We still got that.

Mr. Prestowitz, do you have an idea of how we are going to head this up, other than really reorganizing the Government? When you come up with a Department of Science and Technology, wonderful. I worked with Russell Treen. He and I had the Department of Atmosphere and the Oceans and the Environment all together, and we could not get anywhere. But go ahead.

Mr. PRESTOWITZ. Senator Hollings, I think the question is really not one of organization so much as it is one of motivation.

When you just said this morning—and I do not dispute you—that you and I will be dead and gone by the time there is a Department of Science and Technology, I suppose you are right. But I ask myself the question why. The Russians launched the Sputnik in 1957, and we responded by creating a new department. It is called NASA. We launched on a project to send a man to the Moon in the decade of the 1960's, and we did it.

We thought it was important. We thought it was a matter of high national priority that we beat the Russians in space, and we figured out a way to do it. And we did not come up with a coordinator; we did not come up with an adviser. We came up with a department, and we gave them money and people and authority.

Now, if you want to achieve something in any project, you have got to have somebody in charge. You cannot be an adviser and coordinator. He has got to be in charge. He has got to have bucks. He has got to have troops. He has got to have authority.

You know, you could find it anywhere. It could be the Secretary of Commerce, the Secretary of Defense, the national security—I do not care who the hell it is. But you have got to give him authority, and you are only going to do that if you think it is a matter of high priority.

Now, the fact is that we sit here and we moan and groan about this, and we look at these charts. But nobody really is giving a damn. Nobody here is really that concerned that we are losing our lead in science and technology. We talk about this stuff in terms of the trade deficit, the current account deficit. We have hearings coming out our ears. Everybody comes to the hearings. They go to sleep.

You know, what we are talking about is the future of this country. We are talking about whether or not our kids are going to have the same opportunities and the same freedoms that we had. And we are not giving it that priority.

I think that is the key issue.

Dr. PRESS. May I comment on that, Senator?

Senator HOLLINGS. Yes, sir.

Dr. PRESS. That is a very dramatic and emotional statement, but I disagree with some of the things that were just said.

American science and technology has delivered, by any measure. We are the leading nation in science and technology. Count the recent discoveries. Count the new technologies we have created. Ask any Japanese, German, French, or Englishman which is the leading nation in science and technology, and we will be the one that they will mention.

Our system has delivered. The problems we face are not those of science and technology, our national laboratories, our research universities. They have delivered on their investments. These are economic issues. It is a matter of not being a thrifty nation, a savings nation. It is the cost of capital in the United States. It is the litigious nature of our relationships, the short-term views of American management, the incentive systems for industrial management not to invest adequately in the long term. All of these things together are responsible for our failure to use science and technology. I do not think we need to create a new institution to do science well in the United States. We do it very well at the present time.

Senator HOLLINGS. Thank you very much, Mr. Chairman.

Chairman SASSER. Senator Domenici.

Senator DOMENICI. Thank you, Mr. Chairman.

Senator Hollings, I was going to put a little bit of meat on the skeleton that you discussed and just put in the record, on the issue of global change, what is proposed to be spent in 1990. And I am sure that most Senators and most Representatives in very good faith have bills to do more and to do something different. But let me just read them off.

National Science Foundation is estimated to spend $53 million on that issue; the Energy Department, $27 million; Agriculture, $22 million; National Aeronautics and Space, $21 million; Environmental Protection, $35 million; Commerce, through Oceanic and Atmosphere, $20 million; Interior, through Geological Survey, $10 million—for a total of $190 million.

Now, the problem is not that we are spending money. We are going to spend all this. The problem is to make sure that we have got this coordinated where we are addressing the right issue and have everybody arriving at the conclusions that can be arrived at. And those that are not discernible, we decide whether it should be investigated or not and what should be done. I agree that we need better coordinating. There is no question about that.

Now, let me take off on what you said, Dr. Press. We always compare ourselves with Japan, and that is irrelevant—it is certainly important because somehow or another they captured much of what we do. And when it comes to the marketplace, they seem to be doing it better.

But, interestingly enough, since we have academicians here and since we are very, very proud of our universities and our Ph.D. programs, it is very interesting to me that the Japanese take no pride, have no ambition whatsoever for the creation of Ph.D. degrees in their universities. They produce less than any other industrially developed country in the world by way of the typical Ph.D. They are satisfied with getting a degree from one of their great universities, the first degree in science, physics, whatever it is, and then they go to work, for the most part, in the private sector.

Now, I do not know what that means. It does not mean that they do not proceed from that point on to explore science, but, clearly, they are not using the same grassroots approach. I think it has to do with how they have structured their private sector enterprises with continuity, tax opportunities that lend themselves to research and development, and they are focused on applications once they get there.

I have some numbers that I want to ask a question about, and then I will yield. We often relate shares of GNP devoted to R&D in Japan and the United States. My numbers say, the last we have got, Doctor, for 1986 the R&D expenditures represented 2.8 percent of Japan's GNP. In the United States, it was 2.7 percent of ours. Ten years earlier, it was 2 percent for Japan and 2.2 percent of the United States versus the GNP. Most of the growth in their R&D expenditures has come from industry and not government.

Does this support a suggestion that we do what we can to focus and encourage more R&D funding in the Federal budget, and that we overlook the impact of private industry's expenditures? Or should we be focusing on both? Do you all feel qualified to talk about the relevancy of this comparison?

Dr. Press?

Dr. **Press**. I think what you are describing is correct. That is the situation that has existed in the 1970's and through the middle of the 1980's in Japan.

Japan is changing. They now know that they can no longer rely on our scientific research for their exploitation. We will not let them do it. Secondly, the fields are moving so rapidly in these days, if you do not do the research yourself, by the time you exploit it, your competitor will be way ahead of you.

The Japanese are now changing their system. They are beginning to invest more in their universities, and it is beginning to show. If you survey the world scientific literature where the basic science results get reported, the highest rate of increase of any country in the world is now Japan. That was not the case 10 years ago.

So what you have described is accurate, but the Japanese are future-oriented. They are now looking at their future as a knowledge society, and they are boosting the Ph.D.'s they are turning out and the budgets of their universities.

It is true that most of the research was done in Japan in industry. But that was part of a government consensus, tax benefits, instructions. It is a consensus society. They agreed upon that. That is not to say that our system was bad. They are trying to emulate our research university system, where we educate people, turn out good scientists and engineers, and do the research at the same time.

So why destroy what has worked for us just to emulate them, when they are beginning to copy us? I think both societies are changing. We are doing better in manufacturing. They are doing better in their supportive science. And it seems as if the two systems are beginning to converge as they get ready for intense competition in the next decade.

Dr. **Rosenzweig**. I am meeting next week, or the week after next with an official of the Japanese Ministry of Education who is in this country to find out how we have managed to put together the conduct of research, and the training of researchers in the same place, and why that has been such a productive system for us, and if there are ways in which they can emulate our system.

I have no doubt that they will do it. There is no reason why they cannot. There are no secrets about it. When they succeed, they will become quite a productive nation in the conduct of basic research, I have no doubt whatsoever.

And if we are then smart enough to capture the results of their research as they have captured the results of our research, I think it is a win-win game for everybody.

Senator **Domenici**. It seems to me—do you have something on that issue? I would be glad to hear it.

Mr. **Prestowitz**. Well, I would just say I think the Japanese do envy us our basic research capabilities and our research universities, and they are making efforts to emulate that.

On the other hand, I think it is also true that Japanese corporations carry out more R&D than American corporations do, and that is because the incentives have been set there for the Japanese to do that, and not for the United States. And again you come back to this drag of the military on our R&D efforts, and I think that it is very important that we establish the incentives so that United

States industry is doing R&D on a competitive basis with Japan and Germany, and others.

Senator **Domenici**. I just want to close by saying that obviously, we have an abundance of wealth, and the strength of our research at our universities was the fact that we had a very broad base, and everybody was very free, and we had scientists in a very free atmosphere doing their thing, and that brought the maximum accomplishment.

It was not necessarily cost-effective because that was not the test. My hunch is that even though the Japanese will emulate ours, they will be much more targeted and focused, even when they do that, and that is what we have a great deal of difficulty with, and they will merge institutions in the effort with synergism, and we have a great deal of difficulty with that in our country. That is just my hunch. Thank you very much, Mr. Chairman.

Chairman **Sasser**. Thank you, Senator Domenici. Senator Fowler.

Senator **Fowler**. Mr. Prestowitz. I was listening carefully to your presentation but I still may have misheard you. Did I understand you to say that our children have microchips in the Japanese Nitendo games that are more advanced than the microchips in United States?

Mr. **Prestowitz**. Yes.

Senator **Fowler**. Can you substantiate that?

Mr. **Prestowitz**. I do not have the documentation here, but it is not hard to get. Yes; sure.

Senator **Fowler**. Will you substantiate that to the committee, in writing, and give us that.

Mr. **Prestowitz**. Yes.[1]

Senator **Fowler**. I think that would prove very helpful.

Let me ask you this, following up my friend from New Mexico. If one's theory was that the Soviets are doing everything they can under Mr. Gorbachev to convert their extraordinary military power into economic power, at the same time that the Japanese are on a full-scale rush to convert their extraordinary economic power into military power, would you agree with the latter part of that equation? Leave the Russians alone for a minute.

Mr. **Prestowitz**. Would you repeat that one more time, please.

Senator **Fowler**. Do you think the Japanese, through civilian research programs, and corporate entities, with the research that they are conducting, are actually pursuing blatantly military goals under the guise of economic research?

Mr. **Prestowitz**. I do not think it is as black and white as that. Japan has, for a very long time, defined, and it has done this publicly—this is not secret—Japan has defined its national security in terms of technology and industrial leadership.

And so Japan views achieving leadership in the steel industry, or the semiconductor industry in the same way that we view beating the Soviets in space. It is a matter of national security for the Japanese.

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[1] Information not available at time of printing.

Senator **Fowler**. Can any of you substantiate the rumor—to use the most unemotional word that I can come up with—that actually there is very sophisticated rocketry development——

Mr. **Prestowitz**. Oh, sure. Oh, yes; sure. Let me——

Senator **Fowler** [continuing]. Under their civilian programs which would have, by any layman's determination, unquestionable military benefit?

Mr. **Prestowitz**. Well, let me go on just a minute. I mean, what is happening is that Japan is building quite a substantial military industry, and it makes no bones that it is aiming for maximum self-sufficiency in military equipment.

The H-2 rocket—Japan began with the H-1 rocket, which was built under a license from the Delta rocket of the United States. It consciously went after development of the H-2 as a totally indigenous rocket, and they have achieved that, and the H-2 rocket is a rocket with more—as I understand it—more lift capacity than most of the U.S. unmanned rockets.

Japan has one of the world's most active and aggressive nuclear power programs. A high Japanese official told me recently that Japan could go nuclear, you know, within a couple of months. And I think that is well known. It is not a matter of debate.

But I would not want to clothe it in the garb of a cabal, or a conspiracy, or some kind of Japanese plot to take over the world. I think it is much more amorphous than that.

I think the point is that Japan believes that leadership in technology and industry is the highest national priority, and they organize to get it. I do not think you can complain that they do that. That is their right. I wish that we would do more of it.

Senator **Fowler**. Any other comments?

Dr. **Press**. I agree with that. I think it is a good statement. I think the Japanese realize that the future power in the world is economic power, and that is where they are moving.

Senator **Fowler**. I yield back the remainder of my time.

Chairman **Sasser**. I think you have got another answer over here from Dr. Rosenzweig.

Dr. **Rosenzweig**. No; no. I was indicating that I did not have an answer.

Chairman **Sasser**. I see. All right. Senator Bond.

Senator **Bond**. Thank you, Mr. Chairman.

Dr. Press, in your prepared testimony you expressed a concern about the current practice of combining the DOD research and development budget with the R&D budgets of civilian agencies, and you raise in my mind a question.

Do you think that the money that we are spending on defense-related R&D results in any significant commercial spinoffs? Does that have any role in improving the international competitiveness of American companies? Are we getting the same kind of return out of defense R&D as we do out of civilian R&D? Do you have any recommendations on that basis?

Dr. **Press**. I think the spillover from defense R&D to the civil sector is much less today and is overstated, compared to what it was 20-25 years ago. And unfortunately, when we try to see whether or not our R&D spending is adequate, we lump the entire defense technology budget into the civil budget, add it all together and say, we are spending $67 billion, that is tremendous. But it is not that impressive, because integrated circuits that can withstand a nuclear explosion or a shock are not exactly going to spill over to the civil economy.

An integrated circuit of that kind will cost thousands of dollars compared to the few tens-of-dollar chips that the civil economy needs. I am not sure that the Stealth technology will show up in our civil aircraft, and so on and so forth.

I do not know what the fraction is, but I would be surprised if one-third or one-half the defense R&D budget should be counted in measuring how adequate our support of research is in this country.

Dr. **Rosenzweig**. I would like to add to that, if I might, Senator Bond. There is another hidden problem within the Defense Department R&D budget, and that is that the 6.1 funds, and to some extent, the 6.2 funds. The basic research and fundamental development work that the department conducts has not grown in the last decade or so.

In fact in constant dollars it is less than it was 7 or 8 years ago. And even within that number, the pressures are constantly on those programs from the other elements of the D part of the Defense Department budget, to press them toward—in more applied directions.

What happens is that whenever the services are under budgetary pressure in the R&D area, they aim for that relatively small part of the R&D budget that is in 6.1 and 6.2, and push it further over into the applied area.

So that the Defense Department in fact has not been sustaining its responsibilities in the last 7 or 8 years to replenishing the stock of fundamental knowledge on which their weapons development ultimately rests.

Senator **Bond**. The budget presented by the President has a 22-percent increase in NASA funding. There are several long-term programs in space, the manned space station, the National Aerospace Plane being the most visible.

Dr. Press, would you agree with the importance of those? Are there other projects that you would place higher? Would you agree with President Bush that those should be at the top?

Dr. **Press**. I think that the Nation has to maintain the capability for manned space flight, but before we commit to a concept for the space station, we have to know where we are going in space.

From a recent study that we have done, the primary purpose of the space station has to be the manned exploration of the Moon or the planets, not manufacturing in space, which has been highly overstated, but human exploration in space.

And until we build a national consensus about whether or not, and when we want to go to Mars, or back to the Moon with manned space flight, I do not know what kind of space station we need, in terms of its staging, its phasing, and its configuration. There is no question in my mind that we need some capacity beyond the shuttle in space, but we have to know where we are going before we can decide about the level of funding and exactly what it is we will be building.

Senator **Bond**. How about the National Aerospace Program?

Dr. **Press**. I have not really looked into that to see whether or not it has a military purpose, a civil purpose, what its costs actually will be, and whether it will be commercially viable or not. Those are the questions that should be asked, of course.

Senator **Bond**. Mr. Prestowitz, I was interested in your comments and your writings on the FSX sale. Recently you wrote that the General Dynamics participation in the project will ultimately come out to be only about 20 percent, and I believe the president of General Dynamics has pointed out that the agreement with U.S. industry is that they will get a 35- to 45-percent share of the development budget and the anticipated production budget. Did you take that into consideration?

Mr. **Prestowitz**. Well, my understanding of it is as follows—and the Defense Department has not seen fit yet to make these documents public, so I am speaking from what I have been told.

Initially, in the negotiation on the development budget, the United States asked for 30 to 70 percent, and after long negotiation the United States reduced its request to 35 to 40 percent. Now, at that time, negotiation was being done in terms of a 150-yen dollar. As you know, the dollar during most of that time was 120 yen or 125 yen.

Ultimately, what was agreed upon—as I understand it—is that General Dynamics would receive $480 million worth of subcontract work which is approximately 40 percent of the $1.2 billion budgeted amount for the development of four prototypes.

My understanding is that that is a fixed number—the $480 million.

Senator **Bond**. I disagree. I have not seen it myself.

Mr. **Prestowitz**. I have not seen it either. I asked this question last night of some informed people who told me that that is the case, but I could be wrong.

In any case, the point that I wanted to make is this. The $1.2 billion budget is understated according to most analysts, both in the United States and Japan. Very likely the actual amount is going to be over that.

If, as I have been told, the deal is for $480 million, and obviously, if the budgeted amount becomes more than that, the percentage is less, and if I am wrong, then, fine, I am glad I am wrong. But that is what I was told, as recently as last night, by people in a position to know.

Chairman **Sasser**. Thank you, Senator Bond. Senator Sanford.

Senator **Sanford**. Thank you very much for your testimony and for being here. It is very valuable and we are grateful to you for your time. I think I will focus on just a few questions that may relate more directly to the budget and budget structure, and Dr. Press, I will start with you.

What is the perception, now, in the scientific world, of the intentions of the White House? There is some speculation that something significant may be done, something more than has been done by the past administration.

Do you have an evaluation of what to expect?

Dr. **Press**. I have some mixed feelings. The President has stated that he would like his science advisor to have the rank of his national security advisor. That would place the science advisor at the highest level in any administration going back to Eisenhower, as a matter of fact. Nobody has had that rank.

He has said that the science advisor would have direct communication with him. Now those are very promising statements, and yet, there is growing disappointment that the appointment has not yet been made. It is very important for the science advisor to be on the job early on when budget decisions are being made, and when the 100 or so very important science and engineering appointments in the Government are about to be made. He should be present for those.

President Bush, in several speeches—in fact one at the Academy of Sciences on Friday—mentioned the priority he wants to give to science education and to scientific research. Those are very encouraging remarks, but of course they have to be followed by priorities that show up in the budget allocations.

Senator **SANFORD**. What about the budget recommendations for the Office of the Science Advisor?

Dr. **PRESS**. He has, in his message to Congress, proposed a 30-percent increase. That would not even get it up to the level that I enjoyed when I had that position, but it is a very good first step.

Senator **SANFORD**. Well, you admit it is in the right direction——

Dr. **PRESS**. Absolutely.

Senator **SANFORD** [continuing]. If not enough.

Dr. **PRESS**. Absolutely. And also, the President has proposed doubling the budget of the National Science Foundation within the next 5 years. That is a good sign, too.

Senator **SANFORD**. Well, we talk about the priorities of space, and the priorities in relation to a great many other enterprising, and ambitious scientific endeavors. How do you see those priorities being set as we now view the structure of government?

Dr. **PRESS**. The priority-setting, when you come to something as important as science and technology, has to be part of the political process. We hope the decisionmaking people in the White House are guided by the best information on what the opportunities are in science, what the returns will be to the Nation in meeting some of our national problems, in getting us set for the next stage of competition with other countries, and that sort of input.

And we have given a framework for pursuing that process within the White House and within Congress. I would like to make one point. It is true that we have very severe fiscal constraints and we have to work ourselves out of the deficit problem, but I do not believe that we, as a Nation, can stop investing in the future while we do that, and that means education.

And that means, I believe, the support of science in solving some of the other problems that will enhance our ability to compete, solve some of the problems we have in health, and other areas.

Senator **SANFORD**. Thank you very much. Let me ask you, Dr. Rosenzweig, in terms of the last statement Dr. Press just made about investing in education, in the research university, or in education generally—what do you think needs to be done to facilitate the full utilization of that resource, if, indeed, you agree that we are not fully utilizing it?

Dr. **ROSENZWEIG**. I would say, Senator, as I have said on a number of occasions before, that from the point of view of the future quality of American science and technology, from the point of view of the future quality of the research universities, the most important contributions that can be made now are to the improvement of elementary and secondary education, generally, and in the sciences, specifically.

If I had only one more dollar to spend on improvement of science, that is where I would spend it. Now there is a limited Federal role in respect to elementary and secondary education.

I think it can be played out better than it has been, that money can be used more effectively than it has been, and that probably more Federal money can be used for that purpose, effectively.

Fundamentally, the problem is one for the States and the localities, and the teaching profession, and all of the other elements that we know about, but that is where I would put my first emphasis, Senator.

Senator **Sanford**. Because I assume that people are not coming to the college level well-enough prepared?

Dr. **Rosenzweig**. That is correct.

Senator **Sanford**. But suppose they come fairly well prepared. Where do we stand then?

Dr. **Rosenzweig**. Within the colleges?

Senator **Sanford**. Yes.

Dr. **Rosenzweig**. I think we have, at the major universities and at other universities, we have, on the average, allowed the quality of undergraduate education to slip, and that important efforts need to be made to bring it back to its former quality.

Now, in part, that has been a response to—in some places, at any rate—to the declining quality of undergraduates coming to them, and so the standards have, in effect, been forced down for that reason. But that is not a sufficient excuse.

I think there are other reasons, too, as I indicated in my testimony. I think in many places, an undue and unwarranted emphasis on becoming a major force in research, and graduate education has been traded for a deterioration in the quality of undergraduate education.

That is true not only at lesser institutions, but it is true, I am sorry to say, at some of the best institutions in the United States.

Senator **Sanford**. Thank you. I am sorry, my time is up. If you do not mind, I would ask you to comment on several questions for the record that we will do later on.[1]

Dr. **Rosenzweig**. Yes. I would be happy to.

Senator **Sanford**. Thank you so much.

Chairman **Sasser**. Thank you, Senator Sanford. Senator Kasten.

Senator **Kasten**. Mr. Chairman, thank you. I apologize for being late. I am assuming that you are here in support of the suggestions by President Bush to increase funding by $7 billion or $8 billion on some of the programs within this overall education function. We need increases in the Department of Energy and the National Science Foundation, and also in NASA.

Are there areas in the Bush budget proposals—as we learned them in the state of the Union address and other places—in which your priorities are different from some of the priorities that he has put in?

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[1] See p. 97.

I would guess that everybody would want more of everything. But are there certain parts that you feel—and we will just start, Dr. Rosenzweig, with you—certain parts that you feel our priorities could be reordered a tiny bit?

Dr. **Rosenzweig**. Yes, Senator. I believe so.

Senator **Kasten**. I do not want you to repeat what you have said to——

Dr. **Rosenzweig**. I can be quite brief on this. The major priority issue at the moment, in my view, is to redress the balance between the amount of money spent on military research and the amount of money spent in civilian research.

It has shifted dramatically toward the military side in the last decade, and to the detriment of the civilian sector, and that needs to be changed.

Senator **Kasten**. And is it fair to say that the applications of military research to private industry are less now than they were before?

I mean, one of the things we talk about with NASA is that we spend a lot of money but look at all of the spinoffs that we have been able to achieve and establish.

Is that changing, in your view?

Dr. **Rosenzweig**. I am not an expert on that subject, but Dr. Press has just indicated that that is the case, and that certainly agrees with everything that I have been hearing and reading in recent years.

Senator **Kasten**. Dr. Press?

Dr. **Press**. By and large, I support the President's proposed funding for the National Science Foundation and the Department of Energy.

With respect to the most expensive item in his budget, the space station, I would only ask that we have a sense of direction of what we want the space station for before we decide on the final phasing and configuration and appropriation for it.

Senator **Kasten**. Could you address yourself to the second part of my question, and that is, are we finding, now, that some of the NASA technology, and research, and military technology and research is less applicable to civilian, and to domestic industry than it was at one time?

One of the big selling points for NASA over the many years—and I have been a strong supporter of NASA—has been the fact that notwithstanding the fact that it costs a lot of money, it is the application of these advances over into the domestic economy that means we get a payoff.

Is that not as true as it was once?

Dr. **Press**. Well, it certainly is the case that both NASA and the Defense Department contributed enormously to our civil sector 20-25 years ago. Look at satellite communication.

The returns to the Nation on satellite communication alone might almost pay for the NASA budget over the years. Integrated circuits, computers, microprocessors, new materials. The record is quite good.

But what is happening lately, as we move to more specialized and smarter weapons, and new technologies—the spillover is not that impressive. It is much less.

In fact some people think that the civil sector is doing more for defense technology than vice-versa—that might actually be the case today.

So we are getting much less, and I think we have to decide on defense technologies, not on the basis of what it does for the civil sector, but whether it meets our national security goals. I think that is the way to do that today.

Senator KASTEN. Gentlemen, thank you. Mr. Chairman, thank you.

Chairman SASSER. Senator Wirth.

Senator WIRTH. Thank you very much, Senator Sasser, and gentlemen, thank you very much for being here, and for all of your great help over so many years.

I would like to pick up on Senator Kasten's question about the spinoffs from military research investments.

You said, Dr. Rosenzweig, that the amount of funding going into military R&D has been, for the last decade, increased significantly, while at the same time the civilian side decreased. Is that true?

Dr. ROSENZWEIG. That is substantially the case.

Senator WIRTH. Presumably one would put that kind of funding in military research and development only if you thought that there was a very, very significant threat to the security of the United States. It would of course be in the national interest to do so.

Dr. ROSENZWEIG. Of course.

Senator WIRTH. But, as I look at the world, the world has changed very significantly. We are no longer living in a world where I think most people truely believe that the Soviet Union is going to come across the inner German border tomorrow, to bury us, as Nikita Khrushchev once suggested.

I think it is probably more accurate to look at the Soviet Union as rapidly becoming more like a Third World economy, with an ideological base that nobody in the world takes very seriously.

Consequently, the threat from the USSR is significantly less than it was in the past. At the same time we are seeing the evolution of the Soviet Union, we see another set of very dramatic changes going on in terms of understanding global environment issues. The National Academy has certainly done a lot of work on these matters, and they have just exploded in terms of their importance.

So presumably, a budget ought to reflect the realities of the world out there, and address the kinds of challenges we face. And it troubles me that the Bush budget—as I look at it—does not reflect the reality of the world in the 1990's.

I do not see the need for us to continue this enormous emphasis on military research at the cost of civilian efforts, and I honestly do not see a commitment to the kind of research on global environmental issues that reflects the urgency of that demand.

I would be delighted with any comments that any of the three of you might have, particularly Dr. Press or Dr. Rosenzweig with regards to this statement. This fits right into your back yards.

Dr. **Rosenzweig**. I think, Senator Wirth, for as far as I can see into the future, at any rate, this Nation is going to need a strong national defense and will need a research capacity underlying that national defense.

I think what has happened in recent years—and I see every reason to believe will continue to be the case in years to come—is that the greater contribution to the national security, properly conceived, can now be made by increases in civilian research and development, than can be made by maintaining the present level of military research and development.

That is the basis on which I would argue for a shift. I do not know what the extent of the international threat is going to be, I assume there is going to be one at some level, and in any case, we need a military establishment. But we are talking about changes at the margin, and those changes at the margin make a difference, and they ought to be made, now, in the direction of the civilian economy rather than the military.

Senator **Wirth**. Very quickly, do you have an outline of where those specific shifts ought to be made? If you were sitting where Senator Sasser is, or where the committee is, is there an American Association of Universities' set of specific recommendations as to what spending ought to be lowered and what ought to be raised?

Dr. **Rosenzweig**. We have a lot of ideas about how to spend more money. We have not figured out where to take it from the defense budget.

Senator **Wirth**. Well, as you know, Congress is into a pay-as-you-go mode of operation. It seems to me we also have got to look at areas of current spending to reduce in order to pay for a much needed shift in national priorities.

Dr. **Rosenzweig**. If there is a genuine determination to shift from military to civilian R&D, I have confidence that the Congress will find a way to do it effectively.

Senator **Wirth**. Congress is always looking for good judgment and expert help, Dr. Rosenzweig. Dr. Press, maybe you would like to comment on the second part of my statement. What kind of urgency, what kind of attention should we be giving to these rapidly emerging global environmental issues?

Dr. **Press**. If there is any theme to the testimony of all three of us this morning, it is that there may be a new definition of international security. The economic status of the United States, and the problems of global climatic change; the ecological situation in the world; the threats that may come to society as a result of what we have all been talking about in recent months—climatic change, the situation with respect to ozone and acid rain, pollution of all kinds.

And the fact that the world's leaders are beginning to address them—in fact they are competing with each other in establishing, roles for themselves—I think is a very healthy sign.

Whether the budget reflects that I am not sure. I think that an examination of the budget from that point of view is very much in order.

Senator **Wirth**. Has any outside group taken on this task? Is that something that you all have done?

Dr. **Press**. Well——

Senator WIRTH. I think that there is an urgency to this that we have failed to emphasize in the Budget Committee and in the Congress. Nevertheless, interest in global environmental issues are increasing across the country. The fact is, is that maybe we have got 10 years before one of these major ecological systems snaps. We have got a very, very short period of time to operate, and that means that each one of the commitments that we make in the budget has to—it seems to me—reflect that kind of urgency.

Maybe we ought to ask you to do this.

I would be interested in hearing your recommendations on how best to shift our budget priorities.

Dr. PRESS. We have done that, Senator Wirth. We have prepared a white paper for the administration, outlining our proposals, what should be the first steps in responding to this potential catastrophe that may occur in the next century.

I was pleased that within days after receiving that white paper, the President's new head of the Environmental Protection Agency, Bill Riley, came over, and we gave him a personal briefing, and he indicates that he will make this one of his highest priorities—these global environmental issues.

And I hope that he will ask for increased support to prosecute some of these things.

Senator WIRTH. Then it is my understanding that if we were to look in that white paper, we would find a number of the specific issues that we on this committee ought to be addressing in terms of dollars and commitments, is that right?

Dr. PRESS. That is right. We had a list of things that might be done at the present time to begin a national, if not an international response, to some of these pressing questions.

Senator WIRTH. Thank you very much. We will look forward to reviewing that, and seeing if we can move those up the list of pressing priorities a little more rapidly here. Thank you, Dr. Press. Thank you, Mr. Chairman.

Chairman SASSER. Thank you, Senator Wirth. Senator Simon.

Senator SIMON. Thank you, Mr. Chairman. If I can just steal a phrase that my colleague used about an area that we have to push—the area of security. He quoted Khrushchev as saying "We will bury you." In fact Khrushchev said, "We will survive you," but our linguistic skills were at such a level that we got the wrong translation.

Neither one is a particularly attractive option, I have to say, but there is a difference in nuance between the two.

I think we have to be looking at the future of this country in more than weapons terms, and I think that is the message that you are getting across.

One area that is extremely important is the whole question of how the deficit relates to how we use our resources. The fastest-growing item in the budget is interest. When, as in the last few weeks, the prime rate went up 1 percent, if that holds across the board if that means interest will consume an additional $27 billion this year, when the total federal education expenditure—if you exclude school lunches—is about $20 billion.

A business in Japan that borrows money has to pay a prime rate today of 3.5 percent. A business in the United States that borrows money has to pay 11.5 percent. That 8 percent can mean a lot of research and a lot of other things.

One of the questions I occasionally ask audiences when the question of resources comes up is: "How many of you think Japan is a weak country?" Well, I have asked this question dozens of times. One time, one man raised his hand. But obviously Japan is doing some things that are right. We need to take a look at where we are going in research, in education, and related areas.

Just one other comment. I am lobbying you rather than asking questions. One of the areas where we ought to be doing more research is in the area of finding an inexpensive process for converting salt water to fresh water. Over the long-term, it is of tremendous importance.

It is very interesting. After I began getting into the area of desalination, someone came up to me at a press conference at which John F. Kennedy spoke. A reporter asked him what was the great scientific break-through he would like to see. And he said, "Well, you have heard me speak about getting a man to the moon."

But he went on to say that if we the reporter was talking about a major break-through that would really help humanity, finding an inexpensive way of converting salt water to fresh water would be of the greatest importance.

Under John F. Kennedy, we spent $100 million on desalination research. We are now down to $3 million on research in this area. And as you look at the Middle East, North Africa, Southwest United States, and a lot of other places, it is an area that we ought to be spending more on.

Finally—and I guess I would address this question to you, Dr. Press. We talk about the space station. Obviously, if we can work with the Soviets, with the Japanese, with the British, and the French, and the Germans, and others, in this area, we could save a lot of money and also reduce the fears that exist in the international community.

Are we doing enough to explore the possibilities of working on that kind of a project with other nations?

Dr. PRESS. We did a white paper for the administration on space policy, and we brought that point up. The remarkable progress of the European Space Agency, this consortium of Western European countries, and the Japanese are now moving ahead very rapidly, and certainly the Russians have a capacity—that progress suggests to us that there may be some unrealized opportunities for cooperation in this next stage of human space exploration. I will give you an example.

The Soviets know more about human biology in space, the performance of people in space, than we do, and the main motivation of our space station is precisely that. To find out how humans behave in space.

If we could have some sort of cooperative program with them in this area, we could learn a great deal that we will not have to duplicate, and that might affect the way we design and configure our space station. We may jump beyond them, or ask them to cooperate with us in the next stage.

So there are remarkable opportunities, we believe, for international cooperation, in the next phase of human exploration of space.

Senator SIMON. And my question is, are we pursuing that as vigorously as we should be?

Dr. PRESS. I do not think so.

Senator SIMON. And it strikes me that what we benefit both from their knowledge, and from the money we save by having several nations cooperate in the process.

Dr. PRESS. I agree with that.

Senator SIMON. I thank you, Dr. Press, for your leadership. Let me add, I have seen Dr. Rosenzweig and the leadership he has provided to American universities, and I applaud that leadership. And Mr. Prestowitz, you have stimulated a lot of Americans with your writings, and forced us to rethink what we are doing. Maybe you have not forced us enough, but we are at least thinking about it a little, and I am grateful to all three of you.

Thank you, Mr. Chairman.

Chairman SASSER. Thank you very much, Senator Simon.

Gentlemen, I have not had an opportunity to ask any questions, and I will say to you, I think it is a tribute to the three of you, and to your subject, that there has been such interest exhibited here this morning.

I think even with the Appropriations Committee meeting, and with the Banking Committee meetings going on concurrent with this committee meeting, and others, you have outdrawn, in senatorial interest, the Secretary of the Treasury and a number of other august figures who have testified before this committee.

So, I think there is a pronounced interest here in science, and in your views.

Dr. Press, a couple of things here. According to the Department of Defense, they indicate that research on the strategic defense initiative has the potential to produce enormous commercial spinoffs.

In fact one SDI official was quoted as saying that star wars will create a second industrial revolution. DOD argues that SDI will provide civilian spinoffs in areas ranging from medicine to electric power.

Now, frankly, I find these claims a little difficult to believe. In your opinion, is SDI going to usher in a new industrial revolution, and if you answer in the negative, just what will we get out of SDI on a cost-benefit basis, as far as scientific research is concerned, that can be utilized in a practical and pragmatic way?

Dr. PRESS. SDI is a very expensive way to do civil research. I think the priority that the President and Congress gives SDI has to be its defense mission. It has to be your assessment as to whether or not it is an important defense goal. Solely on that.

To throw in the spillover to the civil sector I think confuses the argument, and also overstates the case for the SDI.

Chairman SASSER. I assume that you would certainly agree with that, Mr. Prestowitz?

Mr. PRESTOWITZ. I do, and I would go beyond that and say that I have always been amused by the fact that when we are trying to sell a weapons program we talk about civilian spinoff. But I always wonder, if we really want the spinoff, why don't we organize to get the spinoff, and get it directly instead of as spinoff? Whenever you propose doing it directly there are all kinds of objections about industrial policy and how you do not want bureaucrats picking winners and losers. And it seems to me it is just nonsense.

Chairman **Sasser**. Well, I would just like to ask the panel this question. I would like for you to provide us with a little perspective on the role of science and technology in our economic competitiveness.

We have all heard that nearly half of all the increases in productivity we have experienced since the Second World War—and those increases in productivity have been significant, although they have slowed down in recent years—but half of these increases in productivity are attributable to technological innovation, and the research and development is the key to that innovation.

But we read statements by such leaders of academia as Dr. Kennedy, the president of Stanford University, who has cautioned against overselling the relation between basic science and our competitive position.

Dr. Kennedy states, and I quote him: "Only about one-tenth of the investment in product creation represents research; nine-tenths represents product development activities that take place outside a university setting."

Gentlemen, do you agree with Dr. Kennedy's assessments, given your experience, and particularly you, Mr. Prestowitz, your experience in trade matters?

Which factors contribute most to our competitive position, and where on the scale does Government support for research and development fall? Mr. Prestowitz, do you want to take the first crack at that?

Mr. **Prestowitz**. Sure. Well, I think in terms of our competitiveness that the—I tend to agree with Dr. Kennedy. I think the development side of things, the engineering application side of things is the most immediate place that we have problems in competitiveness.

Dr. Press disagreed with a statement I made earlier, but in fact I agreed with his disagreement, which is our science establishment is not so bad. We do have the best university system in the world, and this kind of stuff.

But we have not been able to get that—to commercialize that, and get the benefit of that in the past 15 or 20 years, as we did earlier in the postwar era.

And I think that a lot of that has to do not with flaws in science and technology per se, but in the broader economic environment.

I would also say that, you know, much of this depends on your time frame. If you are looking at things in a 10- to 15-year time frame, investment in basic science is probably not going to have a lot of impact on your competitiveness.

Obviously, over a 50- or a 100-year period, if you are not replenishing the pool, it will go dry, and you have to replenish that. One of my concerns is that we have been a pool in the United States, a very rich pool, but that—not only for the United States but for the whole world. And again, there is nothing wrong with that, except that as with any investment, if you do not get an adequate return on it, you tend not to keep investing.

To the extent that our pool is tapped by others, and that we do not get a return on that tap, we are going to tend not to continue to invest.

Chairman SASSER. As long as we keep doing the basic research and the Japanese commercialize that research, that might have a chilling effect on our ability to, our desire to invest.

Does anybody else want to respond to that?

Dr. PRESS. Can I, Senator? Science and technology are our sole comparative advantage over the Japanese. Let's keep it that way. But what we have to learn to do is to integrate our technological policy with our economic policy. That is where our failure has been in the past.

And I know what President Don Kennedy had in mind. He was worried that we would select only those fields of science that have immediate application, and forget about everything else.

That would be a serious mistake, and history shows that to have been a mistake. The transistor came out of solid-state physics. They had no idea. It was serendipitous that the transistor would develop. It created a revolution. The computer information age revolution.

The laser came out of someone fooling around—Charlie Townes—fooling around with the microwave spectrum of ammonia, very fundamental research, and serendipitously there came the laser.

And biologists studying the bacteria that lives in the gut, E. coli—they opened up the whole biotechnology field, not having intended to do so.

So we have to be careful about being selective on things that will pay off in the near term in our support of science, and we have done that.

And finally, a great Nation like the United States deserves to be a world intellectual leader. I think we should be proud that we have done that in the past and we should continue to do that in the future.

Chairman SASSER. I hope we can afford to. Dr. Rosenzweig, do you want to respond?

Dr. ROSENZWEIG. I agree with what both of the previous speakers have said, and I would add only that I think Don Kennedy also had in mind the growth of a set of arguments that make a simple connection between local economic development and the development of science and technology in a neighboring university. It is a lot more complicated than that.

There are going to be winners and losers in that business, too, and when the losers start to emerge, the kind of—there is the danger of a kind of a political reaction against excessive claims that led to the expenditures in the first place, that could be damaging to the whole enterprise.

So I think he was arguing, really, for a kind of an intellectual humility as we try to define the relationship between science, technology, and economic development.

Chairman SASSER. Gentlemen, thank you. I have additional questions which I am going to submit for the record,[1] and Senator Domenici, there is a question for the record from Senator Bond directed to Mr. Prestowitz, and we would ask you, at your earliest convenience, to respond to that question, Mr. Prestowitz.

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[1] See p. 99.

Do you have further questions, Senator?

Senator DOMENICI. No. Could I make just a wrap-up statement?

Chairman SASSER. Certainly.

Senator DOMENICI. It will just take me a moment. Let me say to all three of you, that the problem we have in the national Government, it seems to me is epitomized by the fact that we have the three of you testifying before a Budget Committee, and the fact of the matter is that in order to make the points you have made to us today, and have an impact on the Federal appropriated expenditures in science, research and technology, my best guess is that you would have to appear before at least 5 major committees here, 6 in the House, and perhaps as many as 15 subcommittees in the two Houses. And there is where the decisions are being made, and that is the political reality of the United States today.

I want to say to you, Dr. Rosenzweig, to the extent that I was a bit harsh on your testimony, I apologize. I clearly understand what you were saying, and when you read your entire statement, considering who you represent, you were rather balanced in that you were also critical of excessive expenditures in the university system, and you were quite frank, that to get out of the dilemma we are in, your statement was that we have to start in public education, primary and secondary.

And I laud you for that because I think that is absolutely true. There will be no resource, which is the human resource, in any of this, if the current attitude of our younger generation, and the current excellence in these fields is not dramatically enhanced.

And that will not happen when they are 26. It is going to happen when they are 13, 14, 15, and 16. My final conclusion is that we do not have an appropriate apparatus to help us, and your recommendations that that ought to focus in a science advisor just cries out for solution.

We ought to have, in spite of this diverse jurisdiction, and pet projects, and jurisdictional and parochial interests—we ought to have a scientific blueprint every now and then coming out of the executive branch, that tells us, clearly, if we go with the space money we are not going to be able to go with something else, and what the pros and cons of that happen to be.

Now that is not easy, and scientists are brilliant, and they have their own pets. Sometimes they are objective and sometimes subjective. So we would still get a lot of arguments.

But that does not really happen at all, and it seems to me that we can do a service by urging the President to get that science advisor in there quickly.

His commitment to you, and to us is it will be the best in the country, and no philosophical attributes are intended on his part, and that he intends to use the council.

I can tell you we are going to join together and urge the President to do that quickly. We understand his difficulties, but I think he ought to get that in there before he finishes all the departments, because they are all zealously trying to get on with their programs, and that is pretty much fractionalization.

Thank you very much. Thank you, Mr. Chairman.

Chairman **Sasser**. Thank you, Senator Domenici, and gentlemen, thank you very much for your testimony here today. It has been very helpful.

Our next witness this morning—soon to be this afternoon—is Dr. Alvin Trivelpiece, the director of the Oak Ridge National Laboratory. Dr. Trivelpiece, you were scheduled to be joined by Dr. Hechter, the director of the Los Alamos National Laboratory, but he had to cancel here at the last moment.

I might say that I am very proud of the many years of distinguished service that the Oak Ridge National Laboratory has provided to the Nation, and to my home State of Tennessee, and whether it is playing a crucial role in basic research and scientific education, or in providing the commercial sector with important new technologies, Oak Ridge has proved itself to be a priceless national asset.

So I am especially interested, Dr. Trivelpiece, on hearing your testimony on the role the national labs play in enhancing our national economic competitiveness, and in the interest of time, if you could summarize your statement, I think both myself and Senator Domenici would be in your debt.

STATEMENT OF DR. ALVIN W. TRIVELPIECE, DIRECTOR, OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TN

Dr. **Trivelpiece**. Senator Sasser, Senator Domenici, it is always a pleasure to appear before this committee again.

Chairman **Sasser**. I might say, Dr. Trivelpiece, that you have some staunch and fierce defenders here, as you can tell by Senator Domenici's statements earlier on.

Dr. **Trivelpiece**. Well, my last appearance here was a few days, literally, the first time I appeared before the Congress after presenting the President the arguments regarding the SSC, and this was the first appearance for any committee of the Congress, and you had some rather fascinating questions for me that day, most of which, I think, in the interest of future career development, I avoided rather skillfully.

I was absolutely certain, in listening to Dr. Rosenzweig, that he could possibly not have, even in his wildest dreams, imagined that he was promoting shutting down either the Los Alamos National Laboratory or the Oak Ridge National Laboratory. I feel supremely confident in that. [Laughter.]

You do have my prepared statement for the record and I think, in the interests of time, I would be pleased to proceed directly to questions. If you would like, there were a number of issues that came up during the course of this hearing. I agree with many of the statements that were made by the preceding witnesses, and I would be pleased to provide some additional comments for the record.

Chairman **Sasser**. Thank you very much, Dr. Trivelpiece, and your statement will be included in the record in its entirety as if read.

[The prepared statement of Dr. Trivelpiece follows:]

Statement of

Alvin W. Trivelpiece

Director

Oak Ridge National Laboratory

Oak Ridge, Tennessee

Before the

Senate Committee on the Budget

March 9, 1989

Mr. Chairman and Members of the Committee:

I am pleased to be here today to have an opportunity to present my views on science and technology funding priorities and the impact of these priorities on our economic competitiveness. In 1987, Dr. Robert M. Solow received the Nobel Prize in economics for pointing out that science and technology are the engines of our economy. Scientists and engineers were relieved to learn that this was the case, since they believed it all along. The investment that has been made in basic and applied research by our government has been repaid to the taxpayer many times over in the form of discoveries that have saved millions of lives and led to major industries. Things we take for granted in our everyday lives such as lasers, computers, PETT scans, nuclear medicine, and a host of other items were laboratory curiosities only a few years ago. Probably something like one-third of our gross national product owes its existence to products and services that are based on our fundamental knowledge of the atom and its parts, the electron, the proton and the neutron. The splitting of the nucleus of the atom has changed the way we live, work, and defend our Nation. In light of the benefits that such activities have provided our Nation, it is tempting to suggest that you should allocate funds in such a manner as to result in the funding of all of the basic and applied research for which funding is being requested. Such an approach would probably pay off in the future as well as investments in government-funded research and development have paid off in the past.

Unfortunately, such a suggestion ignores the budgetary constraints under which this Committee, the Congress, and the Administration must now work. The Committee would like to have guidelines and effective mechanisms for establishing science and technology priorities in the federal budget; to know what these priorities would look like; and how these priorities would work to achieve our Nation's goals. It is very difficult to establish priorities within one narrow discipline in one field of science. To try to establish priorities across disciplines is even harder. However, you are quite right to ask that a mechanism for dealing with priorities be sought. You may be unrealistic in expecting that one might be developed in time to aid the Committee in its deliberations this year. But that does not mean you should not insist that we begin the process of developing an approach that would result in a better situation than the present one, which seems to satisfy almost no one.

Scientists and engineers have seen what can be done with the resources they have had to work with in the past. They know what this has meant in terms of growth of our economy and our base of knowledge. They see the United States slipping in its ability to compete in various global market places. They believe that given the right tools, they can get the job of improving our situation done. They may be too optimistic, and in their desire to see us do better, may be asking for more funding than the system can support. I believe that we must face the realities of budgetary constraints and try to do some ordering of the priorities within and between fields of science and technology. This will not be easy, and I do not believe that it can be done quickly.

There will always be differences of opinion as to which fields might be the most promising or the most fundamental. Our ability to predict which are the most promising fields is not too good. Only a few short years ago, it was difficult to find physicists willing to work on trying to raise the critical temperature for the onset of the phenomenon of superconductivity. Now the funding agencies must fight them off with a stick. We scientists and engineers must begin to put our house in order and establish some priorities, but in doing so we must also begin to engage in the larger debate regarding the funding priorities of science and technology with respect to other governmental funding priorities. Scientists and engineers have, in general, not done this except in the occasional reference to how many research grants could be funded if one less aircraft carrier were to be built. This is not very sophisticated, and probably reflects the fact that some of us believe that doing good work should be sufficient and do not understand how an aircraft carrier could be more important to our Nation's defense than advancing scientific frontiers. Well, maybe what seems obvious to some scientists and engineers is not that obvious to everyone else, particularly when we have budget deficits, trade deficits, and the homeless to worry about. The Congress and the Administration are besieged with requests for funding for many worthy programs and must choose among them in the political arena. Scientists and engineers are not a political force in the same sense that many other constituencies are. I believe that this is due in part to the fact that the Administration and the Congress has been fairly generous to science and technology, and for the most part, we have not had too much to complain about. As a result, we have never been too organized in our approach to issues concerning our collective well-being. Put another way, the science vote in Iowa has not been a factor in national politics. It may be that the time has come for us to get better organized in terms of establishing priorities and in being able to engage in the debate regarding science and technology as a priority to be weighed against other national activities.

The funding of basic research is generally recognized as a proper function of government, and it has been funded on the basis of the faith that good results would be forthcoming. And, while the results of the funding of science and technology have not always been obvious in the short term, they have been quite remarkable over the long term. The trouble now is that the competition for resources is much keener, the resources are not as abundant, and the requests for funding for research are growing. Although it does not make the problem any easier, the requests for funding for basic and applied research have been growing for all the right reasons. There has been excellent progress in many fields and the researchers know that they can make progress in some of them that a few years ago could not have been anticipated. As a result, they have proposed new studies that require new facilities to make progress. The difficulty is that many of these proposed new facilities are expensive by previous standards. This has led to a concern within the scientific community that the funding for these new facilities would come at the expense of ongoing or newly proposed smaller scale basic or applied research. The suggestion that priorities be established creates alarm over the issue of who will establish the priorities and who will make the choice among the options: The Congress, the Administration, or their fellow scientists and engineers? We do not seem to want to establish priorities, and we do not seem to want anyone else to do it for us. I do not have a solution to this problem other than to suggest that you remind the science community that if we do not do it, you will. And that if you and the Administration do it by default, then we do not have a sound basis for complaining if we do not like the results. There have been some suggested changes regarding the way in which the Administration goes about reviewing its science and technology funding requests, and I have no doubt that a better vetting process would help, but this does not go to the heart of the matter. In my opinion, it would be desirable to fund all of the high quality research being proposed. This would be a great investment in our Nation's future.

In this regard, I believe that we should go forward with large projects like the SSC, smaller projects like the Advanced Neutron Source at the Oak Ridge National Laboratory, and activities like sequencing the human genome. The problem is one of balance between controlling current year budget expenditures and the funding of excellent research. I believe that it should be possible to start some of these projects on a cash-flow limited basis until such time as they can be funded on a basis that optimizes their construction schedule or implementation. This way, reasonable progress can be made, interest can be maintained, and the scientific and technological future of the United States can be protected.

Establishment of the proper priorities does have an impact on scientific progress. Great Britain was once the leader of scientific endeavors and the envy of the industrial nations. Many fundamental discoveries, including the discovery of the neutron and the fact that the atom has a compact nucleus, are credited to British scientists. I believe that the slippage from that position of prominence was due, in part, to decisions that resulted in science and technology not receiving the same emphasis previously enjoyed. This has had enormous impact on Great Britain's economic system. Great Britain is now in the process of reversing this trend and is regaining its scientific stature. Some countries, through judicious use of government funding to target specific areas for basic and applied research, have reaped enormous benefits. These same countries are among the leaders in many of the world's commercial technology markets.

As an illustration involving a close-to-home situation, materials science was selected some years ago as a priority area for development at ORNL. Since then, materials science has grown to become one of the largest and most productive of our programs. In addition to its scientific progress, this program has made significant commercial contributions. Currently, there are eight licenses for commercial use of silicon carbide whisker-reinforced ceramics. This material, invented at ORNL, is helping the U.S. to regain the part of the $200M/year market for ceramic cutting tools that has been lost to Japan. Another result from this effort was the discovery of nickel aluminide, a material that is six times as strong as stainless steel at 600° C. There are five licenses for applications of nickel aluminides ranging from parts for diesel engines to heating elements. More importantly, materials development has progressed from techniques based largely on experiment and manufacturing experience to a scientific approach based on an enhanced ability to predict properties and design materials for specific applications. This illustrates how targeting an area for special emphasis can lead to evolutionary progress and create a climate in which revolutionary discoveries can occur.

Energy is an area where the issue of priorities is important. The energy crisis of the seventies seems remote now. We seem to have a limitless supply at an acceptable price. That could change at any moment. When that occurs, we will almost certainly mount a number of programs to develop certain technologies on a crash basis. This is not the wisest use of our resources. The roller coaster funding of projects and programs leads to poor use of our resources. It would be difficult to establish priorities in the energy area. To do so would require not only a vetting of the technical issues, but the integration of many political priorities as well. Perhaps this is an area where the Committee could encourage the establishment of priorities to help ensure stable, longer-term funding of activities that would improve our energy security, reduce environmental problems associated with energy use, and create new markets for U.S.-produced goods.

I would be remiss in a discussion of priorities if I did not mention the matter of science and technology education. I believe that we should give a high priority to activities that will increase the number of scientists and engineers. Next week, here in Washington, there will be an American Medical Association sponsored conference, "National Initiative for Science and Technology Education." This conference will focus attention on the problem of the growing shortage of technically trained people for our Nation. The proposed increase in the budget for the National Science Foundation will help in regard to the education of scientists and engineers. In addition, the Department of Energy's national laboratories have an important role to play in the education of scientists and engineers.

As the new Director of the Oak Ridge National Laboratory, I would like to mention some specific activities related to the Laboratory's role in education and technology transfer. Our interactions with industries and universities are important to the success of the Laboratory. Some examples follow:

Highlights

University Programs: Universities play a vital role in ORNL's programs. Our relationship is mutually beneficial. Jointly sponsored research and other interactions provide access to unique facilities and invigorating discussions. Beyond our user facilities, ORNL participates in numerous programs designed to involve university faculty in our research programs and to provide research experience for students, including special programs for historically black colleges and universities. ORNL has close ties with several university consortia, including Oak Ridge Associated Universities, the Southeastern Universities Research Association, the Great Lakes Colleges Association/Associated Colleges of the Midwest, and the Southern College University Union. About 105 co-op students were employed by ORNL last year. In addition, there were about 200 students with formal research-participation appointments. As part of our interactions, universities also do R&D for ORNL. In FY 1988, nearly $20M, or 4.8 percent, of ORNL's budget supported R&D subcontracts at universities.

A unique pioneering science and technology alliance involving three national laboratories (Oak Ridge, Sandia, and Los Alamos) and three minority educational institutions (North Carolina Agricultural and Technical State University, New Mexico Highlands University, and the Ana G. Mendez Educational Foundation in Puerto Rico) was forged by the Department of Energy in 1987. This historical alliance is developing rapidly and successfully. All members of the alliance are working together to share resources in science and technology in a synergistic way.

Precollege Activities: Recently, more emphasis has been placed on precollege activities at ORNL. In 1988, we hosted one of the DOE National High School Honors Workshops. The focus was environmental sciences. Another Special Honors Study program implemented at ORNL in 1986 allows exceptional high school students to conduct a study project under the supervision of a staff member. Seven students participated in 1988, bringing the total since 1986 to 12. A new program, the Summer Educational Experience for the Disadvantaged (SEED), has been instituted to encourage economically disadvantaged high school students to consider careers in science and mathematics. The Ecological and Physical Sciences Study Center is one of the most visible and successful of ORNL's precollege programs. Since its inception in 1983, the Study Center has hosted over 8000 participants. The Center provides hands-on learning in both the physical and life sciences at academic levels beginning at elementary school and extending through senior high school.

Licensing: Our industrial interactions contribute to the competitive standing of our Nation and have contributed to the economic growth of the Oak Ridge area. To date 28 licenses have been signed for ORNL inventions. Annual commercial sales based on recently licensed products developed from ORNL technologies are projected to reach $100M by 1992.

Spin-off Industries: More than 50 businesses in the Oak Ridge area are "spin-offs" from ORNL. These businesses have created more than 1000 jobs. As a consequence of our licensing efforts, industries have also moved to Oak Ridge.

Hertel AG, a West Germany-based supplier of ceramic cutting tools and holding fixtures, will open a facility in Commerce Park in Oak Ridge. Another ORNL license holder, Chemrad, has also opened a branch in Oak Ridge. Chemrad is an instrumentation company based in Texas.

Users and Guests: ORNL hosted 2300 Users and Guests in FY 1988, double the number for 1984. Thirty percent were from industry and 62 percent were from universities. These numbers refer to scientists and engineers who come to ORNL to work with our facilities and to collaborate with our staff. ORNL is the site of 12 National User Facilities, although two of these did not operate last year because the High Flux Isotope Reactor did not operate. One of the newest of these facilities, the High Temperature Materials Laboratory, currently has User Agreements with 23 Universities and 15 industries. Industrial users include Allied Signal, American Matrix, Carborundum Company, Ceramics Process Systems, Dow Corning, Great Lakes Research Corporation, Norton Company, Nuclear and Aerospace Company, Selee Corporation, Tennessee Center for Research and Development, and Thermocore Incorporated. Over 60 research proposals from outside institutions have been approved by the User Advisory Committee.

Superconductivity Pilot Center: Development of high temperature superconductors for commercial applications is one area of current focus. Staff from many universities and several companies are actively working at ORNL user facilities and with our staff on superconductor technologies. Recently, ORNL was named one of three DOE Superconductivity Pilot Centers. Promotion of industrial interactions in the superconductor arena is a focus of the Pilot Centers. The ORNL Center has been quite successful. Work with General Electric has begun and negotiations are in progress with more than ten companies.

Thank you, Mr. Chairman. I would be pleased to answer questions.

Chairman **Sasser**. I, frankly, have perused your testimony in advance and I note that you believe it is important for Congress to provide funding for the Advanced Neutron Source, and Advanced Research Reactor Plan for completion at Oak Ridge in the mid-1990s.

Now, I understand that the research conducted with the Advanced Neutron Source will help the United States remain competitive in materials, research, and development, among other things.

Can you tell us why the ANS is important to our Nation's economic and scientific competitiveness, and what we can do to help see that it is built in a timely manner?

Dr. **Trivelpiece**. There are a number of areas of scientific research in which the people who are pursuing them have been extremely successful. And they have been successful in part because they have talent and they have also been successful because they have the tools. The trouble is that the success that they have produced in the past has generated an ability to penetrate frontiers to the point where they need additional tools.

The use of neutrons, as a means of understanding and characterizing states of matter, is extremely important. The United States cannot afford to be behind in that and a facility such as the Advanced Neutron Source would provide that kind of capability for the Nation.

I have been, in the past, a little distressed to watch some of the university research reactors shut down, and I understand the reasons for that. I look at a location like the Oak Ridge National Laboratory, and it seems to me to be an ideal location for such a research facility. Not only that, but also to become a nuclear research campus in which universities and other institutions could use it—industry and the like.

With regard to getting it done, I think that the laboratory has a good conceptual design report activity underway. The Department did fund it at a level that they thought was appropriate. We believe we would like to go a little bit faster.

You cannot build an object of that size and complexity without doing a proper conceptual design report and that takes a certain amount of effort. We would like to move a little faster than the Department currently has us scheduled for.

Chairman **Sasser**. Thank you, Dr. Trivelpiece. Do you have any questions, Senator Domenici?

Senator **Domenici**. Mr. Chairman, let me just join in your opening remarks and to indicate to you, because Dr. Trivelpiece is now in your State, that I got to know him very well when he was in the Department of Energy and I am absolutely confident that the decision to put him in the position that he now occupies is going to be a good one for the national Government and clearly for the people in your State that are related to the Oak Ridge National Laboratory.

I compliment you for your past work and in advance for the good work that you are going to do with this institution.

I have a little bit different approach than the good professor about how we ought to treat the laboratories. Frankly, the way I would do this is, I would assume that they have a degree of capability beyond their mission because of the diversity of scientific capability and because they are much in the atmosphere in the university, even though they are mission-oriented.

Consequently, it seems to me that where we are really missing—and one point that we are missing is, as we look at areas of need that are complex and diverse and multiyear and breakthrough or problem-solving, that nobody is really taking the time to evaluate the laboratory's capability and see if some of this fits. It is done in a very willy-nilly manner now, with the laboratory proposing and the Department of Energy or some other department, taking them up on it.

In addition, I believe we really have to work hard at making the private sector and academia feel more comfortable in working with your laboratory and the others in the country, including the nuclear laboratories. It is not a culture of accommodation because it was not started that way.

In that regard, it seems to me that the buzzword is "technology transfer," and I believe you are making some strides and you are less inhibited than the three nuclear facilities.

I would ask you if you are familiar with Senate bill 1480 from last year, which has now taken on a bit of a life of its own—that is the technology transfer effort that the Senate passed with reference to the national laboratories?

Are you familiar with it at all, Doctor?

Dr. **Trivelpiece.** Generally familiar, but not in specific detail at the moment. I did read it earlier.

Senator **Domenici.** Could I ask—do you feel that the national laboratories that you are familiar with, the one you are in and/or the others, have a capability in some of the very big issues of our day, to involve themselves in those as ancillary missions, such as—is there not a great deal of capacity in the global warming area, scientific capacity within the national laboratories as you know them?

Dr. **Trivelpiece.** I think it is more than that. They have, in some sense, been among the leaders in this. The carbon dioxide research, a good portion of it, has been done at the Oak Ridge National Laboratory. A lot of the published data, the data center that coordinates that—this possibility, I think, is quite good. Yes, the national laboratories should play a role in that activity. They have the tools, the capability, and the talent, and I would strongly encourage them to do so and I intend to do what I can to see that Oak Ridge is involved in this as much as it can be.

Senator **Domenici.** Another example—we are going to spend $1.5 billion to $2 billion in each of the next 2 years to do the preliminary design and engineering work for the so-called nuclear clean-up attendant to nuclear arms arsenal, before we even get to building it—building the clean-up.

I understand much of that is really theoretical—the evolution of new ideas and concepts. It seems to me that we are going to go out and hire universities and consultants. Is that not another fertile area where the national laboratories have a tremendous amount of expertise if they would just be utilized?

Dr. **Trivelpiece.** The area of waste research and development, I think, is exceedingly critical to our Nation. It is true that some of the problems in this area are residing in some of the DOE facilities, prior AEC facilities. The sort of numbers that are talked about are $30 to $100 billion to clean that up.

It would seem to me to be a poor use of our national resources if some fraction of that were not devoted to trying to learn better how to prevent waste from occurring in the future, how to handle it in the present, and how to take care of that which has done in the past in a manner that does not require a $30 billion to $100 billion expenditure.

There is always a tendency to sort of go after just fixing it now, rather than trying to understand better how to prevent the problems. So, I think that is a vital role for the national laboratories and again, it is an area in which I think specifically Oak Ridge has a role to play.

Senator **Domenici**. Thank you very much, Mr. Chairman.

Chairman **Sasser**. One final question, Dr. Trivelpiece.

I am troubled because there does not seem to be an institution in our set-up that supports civilian-applied research. For example, it appears to me we need an institution that performs the same role with regard to applied research, like perhaps the Bell Labs used to do before the AT&T break-up in such areas of research as applied research for transistors and semiconductors.

Could the national labs play a role in filling in this deficiency with regard to applied research that I perceive?

Dr. **Trivelpiece**. I think in many cases they are already doing that. If you look at the so-called IR-100 awards, which are awards given for technology applications, that the national laboratories usually compete with and exceed the performance of many of the major industries in the United States. Many applications come out of them.

Whether or not you could find a way within the Federal establishment to put together an organization that would specifically respond to that, I am not sure. That does not seem to be an easy thing to do. That gets into this issue of a science and technology agency.

But it is a question of awards and I think, to the extent that the intent of the administration and the Congress were made clear through the various funding agencies, that a certain fraction of the resources should be used for technology applications, that would likely occur.

Chairman **Sasser**. Well, don't you think that our national labs—or, I will ask you this question point-blank.

Are our national labs being under-utilized——

Dr. **Trivelpiece**. Yes.

Chairman **Sasser** [continuing]. With regard to their capability to do applied research?

Dr. **Trivelpiece**. Yes, and let me expand on that just a bit.

Chairman **Sasser**. I think so, too.

Dr. **Trivelpiece**. The many academic institutions and some Federal research institutions are very neatly compartmentalized into disciplines of physics and chemistry and so on. I think one of the hallmarks at DOE national laboratories is that a given problem can be worked on by a collection of physicists, chemists, mathematicians, engineers, biologists in an interdisciplinary way that no other institution that I am aware of in the United States, excep some industrial organizations, can duplicate.

That should be taken advantage of and there are many things that have come from that. In fact, one in the Los Alamos National Laboratory, a technique called flow cytometry was developed in a biology program. That tool is now used by scientists at NIH and many other institutions. It is a commercial product.

It permits the sorting of cells at 10,000 per minute in a way that allows some of the things that need to be done in connection with sorting the human genome. That kind of a device and tool I cannot see having come out of some of the other straight discipline-funded research that has been available in the United States.

Chairman SASSER. Thank you very much, Dr. Trivelpiece. We very much appreciate your testimony and your attendance here today.

Dr. TRIVELPIECE. Thank you, Mr. Chairman. It is a pleasure.

Chairman SASSER. This hearing is adjourned.

[Whereupon, at 12:15 p.m., the committee as adjourned, subject to the call of the Chair.]

AAU Association of American Universities

President

Questions from Senator Sasser on Facilities

Dr. Rosenzweig, as President of the Association of American Universities, you have been right in the middle of the debate on research facilities. Most of us are aware that the physical infrastructure needed for science is in desperate need of repair.

Last year the Congress did take a step toward rectifying this problem by authorizing a facilities program in the National Science Foundation. The money authorized for the program, however, in in addition to that needed to double NSF's budget by Fiscal Year 1993.

What the Congress has said is that facilities is an important problem but not as important as increasing the funds for basic research. Do you agree with this priority?

Response from Dr. Rosenzweig

My interpretation of the action of the Congress last year in enacting a new science facilities program in the context of the NSF Authorization is that the Congress found that it is important both to double the size of NSF and to fund the facilities program. I do not view that legislation as expressing a preference for one over the other. That is AAU's position, as well. Many things can happen in the course of the budget and appropriations processes that may require new judgments under new conditions. Since I cannot at this point know what those might be, I still urge that both the 14-percent NSF increase and a start for the facilities program be funded.

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AAU

Association of American Universities

President

Questions from Senator Sasser on Science Recruitment

Dr. Rosenzweig, as we look to the future of science in our country I believe that one of the most fundamental questions is how will we train and recruit our next generation of scientists and engineers. It seems that every time I pick up a paper or a magazine there is a story about how industry is in desperate need of technically trained personnel.

Clearly something must be done. But if I understand you correctly, you are sounding a note of caution. You have stated that government involvement in adjusting the normal market forces for scientists and engineers probably will do more harm than good.

In this ever increasing high tech age, can we really have too many scientists and engineers? In your opinion, what should be the government role in the supply of scientifically trained personnel?

Response from Dr. Rosenzweig

There is serious cause for concern about our future supply of scientists and engineers. The concern applies to technically trained personnel at all levels–bachelor's, master's, and doctoral. The particular focus of AAU is research and graduate education, and I will focus in this response on the supply of Ph.D. talent.

In the mid- to late 1990s, increased faculty vacancies will coincide with increased college enrollments to put great pressure on colleges and universities for teaching faculty. At the same time, industry and government will need increased numbers of Ph.D.s to carry out the R&D necessary to meet mounting economic competition from abroad, to maintain our technological edge in national defense, and to develop major new initiatives such as the SSC, the space station, mapping the human genome, and other challenges and opportunities on the scientific horizon.

These factors will combine to increase substantially the demand for science and engineering Ph.D.s, yet supply is moving in the opposite direction. For the last decade the proportion of Ph.D.s going to U.S. citizens has been declining. Interest by college freshmen in science and engineering careers continues to decline. Richard Atkinson, President of AAAS and Chancellor of the University of California, San Diego, has recently presented an analysis showing that present trends will result in an annual shortfall of 7,500 science and engineering Ph.D.s just a few years into the next century.

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The Ph.D.s needed to prevent such a shortfall should be entering doctoral programs now. The median time to degree is just under seven years. Such a long time frame assures that market forces, if any, will be exerted too late to be effective.

This prospect of increasing demand and decreasing supply threatens to pit universities, industry, and government against each other in a bidding war for scarce Ph.D.s. There is an urgent need for prompt federal action.

My note of caution refers not to the existence of a serious national problem, nor to the need for a concerted federal response, but to the mechanism by which that response is carried out. Manpower predictions are notoriously difficult to make with precision. Moreover, past experience has shown that aiming a federal manpower response at an elusive target is not likely to provide an optimal solution.

Instead, the federal government should put in place a coordinated strategy focused on quality, not quantity, through a set of programs designed to attract an increasing portion of the country's most talented students into doctoral programs. Federally funded fellowships and traineeships have plunged from a high of 60,000 in 1969 to less than 14,000 today. The following actions would reverse that decline and provide the necessary incentives to attract more U.S. talent into doctoral programs:

- support the Administration's proposed doubling of the NSF Graduate Fellowship Program

- provide adequate stipends in the NIH/ADAMHA National Research Service Awards and increase the number of trainees to meet NAS targets

- expand fellowship and traineeship support in DOD, DOE, NASA, and USDA, the other federal agencies providing substantial support for university research

- expand and adequately administer the graduate fellowship and traineeship programs of the Department of Education.

In each case, the focus should be on programs designed to attract exceptionally talented people into doctoral education. Particular emphasis should be given to increasing the number of Ph.D.s earned by women and non-Asian minorities, who remain severely underrepresented in doctoral programs. By substantially increasing the number of federally funded fellowships and traineeships across agencies and across disciplines, the government would put in place a balanced set of incentives to attract a larger number of talented students into doctoral programs. Through an emphasis on quality, it would provide the soundest approach to maintaining the scope and vigor of U.S. science and technology. Such a federal strategy, in concert with the government's current support of science and engineering doctoral students through research assistantships and with support provided by universities, industry, states, and students themselves, is the best way to keep supply and demand in balance.

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Association of American Universities

President

Questions from Senator Sanford on Science Policy

Now, perhaps more than ever before, given the competitive and rapidly changing world in which we exist, we need a sound national science policy. The present budgetary constraints make this even more necessary, I believe.

How do we set about developing a national science policy that we can manage adequately and keep current to reflect the future changes in this rapidly changing world? How do we develop a national policy that will best define our priorities to meet our needs both in the present and in the future? What disciplines should be involved? How should we determine the proper balance between academe, the private sector, non-defense government, and defense, as well as between big science and little science? And how should this work to influence our budget priorities?

Response from Dr. Rosenzweig

Senator Sanford, I agree completely that the dictates of our competitive rapidly changing world require us to develop sound national science policy. How do we do that?

The first step , I believe, is the recruitment of the most able people for the job. President Bush has announced his intention to appoint an Advisor for Science and Technology and to upgrade that office and its staff. The appointment of a strong, widely respected individual who can command the attention of government agencies, industry, and the academic community is the essential first step toward a more effective national research and technology policy. Science, technology, and education concerns permeate government's domestic, defense, and foreign policy agenda. Only the Executive Office of the President, through the activities of the Advisor for Science and Technology, can bring to bear the necessary governmentwide perspective; marshal the resources of the agencies, industry, universities, and national organization; formulate needed approaches; and convey to Congress a coherent sense of the challenges, choices, and priorities before us.

Second, the Advisor for Science and Technology will require the support and cooperation of equally able individuals in the key science and technology posts of the research agencies. Strong individuals appointed to these posts, working closely with the Advisor, can bring the enterprise the coherence and direction it requires. Budgetary realities mean that we will need to do a better job of policy and program coordination governmentwide; reallocations of resources will be required when expansion is impossible. Regulatory and tax policies need to be reviewed and formulated with an eye to their consistency with and implications for science and technology priorities and

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initiatives. Federal investments in the nation's knowledge base and in the education of our people, especially minorities and women, need to be carefully crafted so that when the effort is added up, the sum of federal activity is greater than the contributions of the individual parts of the system.

We have suggested to the Administration that a new Presidential Executive Order could set governmentwide goals, objectives and guide the development of new policies. We hope to discuss this with the new Advisor as soon as possible. The AAU is prepared to play its part as constructively as we know how.

WRITTEN QUESTION FROM SENATOR BOND TO MR. PRESTOWITZ AND THE RESPONSE

Question. One of the primary arguments against the FSX sale has been that it would give the Japanese the technology and know how they need to develop a civilian airliner industry and compete with Boeing and McDonnell Douglas. This argument ignores the fact that Japan has been building military planes under license for nearly 30 years, and that it developed and build the F-1 fighter without U.S. assistance. More importantly, it ignores the fact that Japanese firms have been heavily involved as subcontractors to Boeing for years—including work on the 707, 727, 737, 747, 757, and 767. In fact, 19 Japanese firms are building approximately one quarter of the Boeing 767 including the main part of the fuselage and parts of the wing.

Why do you believe that Japanese co-development and co-production of this one-man fighter aircraft will give the Japanese significantly more know how than they have gotten from decades of building U.S. planes under license and developing their own plane? How can this figher technology be more of a threat to U.S. industry than the Boeing work that has been going on for years and which has not brought similar outcries from you or other opponents of the FSX deal?

Answer. It is important to make a distinction between co-development and license production or co-production. Under license production, the Japanese and/or other foreign companies produce a product or assemble parts that have been designed, engineered, developed and previously build by U.S. manufacturers. In the case of the Japanese work on the various Boeing jets Japanese subcontractors provided parts for Boeing jets but these parts are designed, engineered and developed by Boeing. In the case of co-production by Japan of the F-15 or co-production by other countries of the F-15 or F-16, the work involved is primarily the assembly of parts and systems designed, developed, and integrated by U.S. manufacturers.

There is a thing called a value-added chain in aircraft production and indeed in any production of sophisticated products. It takes less technology and less know-how to build landing-gear or to assemble portions of fuselage than to conduct the wind-tunnel tests necessary for design of aircraft wings. It takes less technology and less know-how to design an aircraft wing than it does to integrate all the systems of the airplane into a single working design.

Under all of the arrangements that the United States or U.S. aircraft companies effected with Japan and other foreign manufacturers, the work allotted or assigned overseas has been a lower value-added, less sophisticated work. Boeing has never contemplated including Japan in systems integration nor has anyone else. Co-development involves jointly conducting aerodynamic wind-tunnel tests, wing design, systems integration, avionics in short of all of the most sophisticated, most advanced parts of the chain. In effect, the U.S. under co-development would be showing Japanese manufacturers exactly how we design, develop and engineer aircraft.

Japan has little experience in these high value-added operations It is true that Japan developed and build F-1 fighters on its own. It is also true that one reason the U.S. airforce wants Japan to replace the F-1 is because it is considered by the U.S. DoD to be a totally inadequate airplane, reflecting Japan's lack of experience in aircraft technology.

Co-development is clearly a far step beyond co-production and a far step beyond the subcontracting work done for Boeing by Japanese suppliers. It is the difference between giving a contractor a blueprint for a fender and asking him to supply a fender according to predetermined specification and sitting down with a contractor and teaching him how to design and produce a whole car.

Implicit in your question is the assumption however that previous co-production arrangements have been good from the U.S. point of view. I do not believe that is the case. In 1982 the GAO prepared a report on the co-production of the F-15s by Japan. The GAO severely criticized the arrangement emphasizing that Japan had obtained a great deal of technology which it had used for the purposes of competition with the U.S. aircraft industry. The GAO recommended against further deals like that for the F-15.

The really disturbing aspect of the FSX deal is that the DoD completely ignored the findings of the GAO and is proposing to take a step which will involve even more technology transfer than that of the F-15.

With respect to the last part of the question I previously was a vigorous opponent and cried out against the F-15 co-production project, the FX co-production project with Korea, the Boeing 7J7 deal with Japan and, of course, the FSX. The difference is that in earlier days I and a few others were voices crying in the wilderness. As a result of the seeming intractability of our $55 billion trade deficit with Japan and the accumulation of reports similar to the GAO report now a few other voices are joining my cause which is why the FSX is coming to the forefront.

WRITTEN QUESTIONS FROM SENATOR SASSER TO MR. PRESTOWITZ AND THE RESPONSES

Question 1. Mr. Prestowitz, as I am sure you are aware, the semiconductor industry association decided, on its own, that a cooperative R&D effort was needed to regain the dram market. The government agreed, and the result was SEMATECH, a $200 million government-industry partnership.

The operating budget for Sematech is rather small compared with the R&D budgets of IBM and AT&T, and even smaller when compared to the combined R&D budgets of the members of Sematech.

Given the large resources available to the members of the seminconductor industry association, why did the government need to contribute half of the operating costs? In your opinion, what should be the government role in such cooperative effort?

Answer. Of course, IBM, AT&T and other enterprises have significant R&D budgets. But even so SEMATECH represents a significantly increased amoung which means that if it was to be funded entirely from private funds, their previously funded research would probably be delayed. The government contribution was one way of increasing the overall U.S. R&D effort.

More important however the government contribution to SEMATECH was a sysmbolic statement of the government's attempt to maintain a viable semiconductor industry by reducing the risk of investment by private industry. Without government contributions it is not likely that any private money would have been put up because the risk would have been too great.

Part of the situation is like the Chrysler bail-out. The important part of the bail-out was not that the U.S. government put up money, it did not. It was the fact that this guarantee reduced the risk for private interests. Sematech is the same.

Question 2. In Japan and Europe, more than 50 percent of government expenditures on research and development go to specific economic objectives in agriculture, energy, industry and natural resources.

The U.S. figure has historically been closer to 30 percent, but our actual expenditures on such objectives have dropped sharply in the last eight years, both as a percent of the total and in real dollars.

What effect does this difference in targeting have for the economic competitiveness of our country versus our competitors? In other words, where should the boundary be at which government investment stops?

Answer. I believe the difference in targetting has a very negative impact on U.S. competitiveness. Targetted R&D expenditures have a much better chance of resulting in commercial production than general R&D expenditure. Moreover, with government targetted R&D they automatically reduced the risks in these areas and thereby induced private investment.

Our tendency to emphasize basic research results in transfer to others and diffusion of effort which means we often do not realize the fruits of our R&D investment.

VIEWS OF THE SECRETARY OF DEFENSE

TUESDAY, MARCH 14, 1989

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Washington, DC.

The committee met, pursuant to notice, at 10:09 a.m., in room SD–608, Dirksen Senate Office Building, Hon. Jim Sasser (chairman of the committee) presiding.

Present: Senators Sasser, Exon, Lautenberg, Simon, Conrad, Robb, Domenici, Symms, Grassley, Kasten, Nickles, and Gramm.

Staff present: John L. Hilley, staff director; and Doug Cook, assistant director for national security and foreign affairs.

For the minority: G. William Hoagland, staff director; and Richard Doyle, senior analyst for defense.

OPENING STATEMENT OF CHAIRMAN SASSER

Chairman SASSER. The committee will come to order.

Today we have gathered together I think some outstanding defense experts to discuss the future, where we need to go, and how we should get there.

First, this morning, we will hear from the Acting Defense Secretary, Mr. Taft, and the chairman of the Joint Chiefs of Staff, Admiral William Crowe.

This afternoon, we will hear from former Undersecretary of the Navy, James Woolsey, the Director of the Defense Budget Project at the Center on Budget and Policy Priorities, Gordon Adams, and Barry Blechman, the author of a report on the prospects of a conventional arms control agreement in Europe.

I think today we stand on the brink of a new era in national security. A new Soviet leader has appeared to recognize modern day economic reality, that no nation can devote a disproportionate share of its national product to defense indefinitely, and still expect to grow economically and be competitive internationally.

In Europe, we see our allies moving toward an economic union in 1992, and this decision signals their own acceptance of the fact that economic competitiveness requires flexibility and new models.

By most accounts, if these nations are successful, they indeed will become more competitive. If so, what will that mean for our military relationship with our friends and allies in Europe?

Will the American people continue to feel the necessity to support a large presence of U.S. soldiers in Europe, particularly at a time when calls for reallocating the security burden within the alliance are increasing.

In Asia we also see changes taking place. Some have argued that Japan should increase defense spending as a share of its GNP from its current level of 1 percent to as much as 3 percent of Gross National Product.

This would bring the total Japanese defense budget to over $100 billion, and place Japan second to the United States in military expenditures in the free world.

Perhaps before we encourage the Japanese to pursue this course—and frankly, I have some reservations about it—we should consult with our other Asian friends such as Korea, the Philippines, and China.

Still others have suggested that Japan can best contribute to protecting Western interests in Asia, and elsewhere, not by increasing its military expenditures, but rather, by providing funds to countries in need through multilateral economic aid organizations, and through helping defray some of the U.S. costs of defending Asia.

Some of the voices from the Pentagon indicate what appears to be an awareness of changing realities. Even such strong advocates of growing defense budgets as former Navy Secretary John Lehmann argue for a greater reliance on the reserves, and adjustments to our current force structure.

But it is unclear yet what priorities are going to emerge. Will budget restraint resolve in decisions to preserve force structure at the expense of readiness, as we did in the 1970's?

Or will we ensure that our military personnel receive an appropriate high priority in both their training and their benefits?

Will we continue to drag our heels in response to Gorbachev's proposals or will we react with bold and creative suggestions of our own, that protect both the United States' interest and those of our allies?

We hope to answer some of these questions today, after hearing from our distinguished witnesses. And finally, we are all well aware of the fiscal constraints that this Nation faces today.

We are also becoming more aware of the many investments we need to make to fund the future. If we are to remain economically competitive and militarily strong, we must recognize, as President Eisenhower did in 1957 with the National Defense Education Act, that an appropriate conception of national security extends from the cockpit of an F-14 to the classroom in the American towns and cities across this country.

We cannot expect to lead the world of the future if our students trail the world of today in many measures of intellectual achievement.

I want to thank our distinguished witnesses for appearing today. First, to the Acting Secretary of Defense, Mr. Taft, I want to say to you publicly what I have expressed to you private—our profound thanks for performing your duty in exemplary fashion over the past few months, and what I would imagine have been trying times in the Department of Defense.

We are in your debt for that and we appreciate very much your professionalism.

And to our great good friend, Admiral Crowe, a man who I have said has been the best chairman of the Joint Chiefs of Staff in my short 13-year tenure here in Washington, we are pleased to have you with us today, and I want to compliment you for your leadership in the JCS, in the post-defense reorganization era, and many of us have admired your outstanding contributions in many, many areas.

We will turn, now, to our distinguished ranking member for any comment that he might wish to make.

OPENING STATEMENT OF SENATOR DOMENICI

Senator **Domenici**. Thank you, Mr. Chairman. I would ask that my statement, with your permission and concurrence, be made a part of the record as if read.

Chairman **Sasser**. It will be included in the record.

Senator **Domenici**. I want to say to our two distinguished witnesses, I join in thanking both of you, not only for being here, obviously, but for your past service. Secretary Taft, I think you came to this job highly recommended, but clearly, many thought you did not have enough experience for the job. I want to tell you that, however it came about, you have proved yourself, and I compliment you for it.

I also want to apologize to the extent that we do not have more members here. I do not really understand what is happening in our Senate. Normally, we do not have so many hearings, but if the Senators are like me, the problem is that they have at least three other hearings going on at this particular moment, and I would hope that it is not an indication—nor that you would assume it to be the case—that they are not interested in your views—we are all very concerned. The absence is not an indication that we are not concerned.

Having said that, let me borrow a couple of phrases that the chairman used. I think we are on the brink also, but I think maybe we are on the brink of having an opportunity to dramatically change the threat in the world, but I use the word "brink" meaning that we are not there yet.

It seems to me that there is not any question that the economic success of the free world, and the exact opposite in the Soviet Union and her satellites, is causing some significant political and economic turmoil within the Soviet Union.

But it also seems to this Senator that this brink is a rare opportunity, and the opportunity is to see to it that the free world, in terms of military might, international prowess, remains in a position to force the Soviet Union to make some real serious decisions. They must understand that the force structure and the military might of the free world is still aware of the fact that the communist party and the Politburo still control military forces that are absolutely astronomical. To this point, while there has been some evidence of withdrawal of troops and the like in Europe, there is very little evidence that they have cut back dramatically in the production of tanks, in the production of submarines, in the production of airplanes, and in the force structure of the Soviet Union and her satellites.

We do not know how that is going to turn out, but we do know that they own them, they operate them, and they manage them at this point. It is relatively easy to determine if the United States is changing its defense posture for us. We do things quite openly. It is not quite so easy for us to guess what they do when they do very little in the open.

So I submit this is a very, very significant transition period for the United States. I am very hopeful that today you will address yourself to the issue of how much we have already reduced the recommended force structure, and everything that goes with it, to get to the Reagan budget. And then how much further we will have to reduce that to get to the Bush budget.

Everyone should understand that we are talking about cuts when we talk about what has happened the past 4 years and what the Bush defense budget entails. There are cuts that had to be arrived at from the 1987 economic summit numbers, and for the Reagan numbers, and there are further cuts required to get to the budget, in gross numbers, recommended by President George Bush.

Some do not understand we have already reduced and cut, and that we will have to do even more of that. I hope you will help us to understand that. While we will not have details, I think it ought to be rather easy to understand that we have forced this reassessment—this will be the third time in 4 years—of a dramatic type. And I understand that is not easy to do, and I am hopeful we will understand it better when we get to mark up and discussions on settling the major issues and components of the Federal budget.

Last but not least, we have a Federal deficit. It is significant; there is no question about it. We have competition in the world, economically; there is no question about that either.

But I think that there is an extreme risk, that in the name of the deficit we will restrain defense spending to the point where we will regret it some day, where it might cost us more, where we might not reach the fruition and full benefits that have come with the sacrifices the American people have made to build back our military strength to this point in a changing world, and we have indeed been part of causing that change for the better.

Thank you very much, Mr. Chairman. I look forward to the witnesses.

Chairman SASSER. Thank you very much, Senator Domenici.

[The prepared statement of Senator Domenici follows:]

OPENING STATEMENT

HEARING ON THE DEFENSE BUDGET

Senator Pete V. Domenici

March 14, 1989

GOOD MORNING SECRETARY TAFT AND ADMIRAL CROWE. WELCOME TO YOU BOTH. GIVEN THE EXTRAORDINARY PRESSURE YOU MUST BE UNDER, I VERY MUCH APPRECIATE YOUR EFFORT TO EXTEND US THE COURTESY OF APPEARING HERE THIS MORNING.

BEFORE WE HEAR YOUR TESTIMONY, I WOULD LIKE TO MAKE A FEW OBSERVATIONS. I WOULD WELCOME ANY COMMENTS YOU MIGHT HAVE IN THE COURSE OF YOUR TESTIMONY.

I HAVE REMARKED MANY TIMES THAT THE WORLD IS CHANGING VERY QUICKLY ECONOMICALLY. I AM NOT SURE THAT WE UNDERSTAND THE IMPLICATIONS OF ALL OF THIS ECONOMIC CHANGE.

BUT, I AM ABSOLUTELY CONVINCED THAT WE DO NOT HAVE A GOOD GRIP ON THE POLITICAL CHANGE THAT HAS COME ALONG WITH ALL OF THIS ECONOMIC CHANGE.

MOST OF THE WESTERN INDUSTRIALIZED COUNTRIES ARE OPEN, FREE ENTERPRISE ECONOMIES, AT LEAST TO SOME DEGREE. THIS OPENNESS IS NOT AN ACCIDENT BUT RATHER THE PRODUCT OF SOME VERY FARSIGHTED AMERICAN LEADERSHIP DURING THE YEARS IMMEDIATELY AFTER WORLD WAR II. WE ALL HAVE BENEFITTED IN TANGIBLE MATERIAL WAYS FROM THIS OPENNESS.

STILL, PROBABLY THE MOST IMPORTANT BENEFIT OF THIS OPENNESS IS NOT AT ALL ECONOMIC. THE MAJOR BENEFIT TO AMERICA HAS BEEN THE TRANSFER OF SOMETHING INTANGIBLE -- A TASTE FOR FREEDOM AND THE HOPE FOR EQUALITY OF OPPORTUNITY AMONG MOST OF THE COUNTRIES OF THE WORLD.

WE HAVE EXTENDED THE PERIMETERS OF FREEDOM AND ECONOMIC SELF-SUFFICIENCY. WE HAVE DONE THIS WITH THE CONCURRENCE OF OUR ALLIES. BUT, THE MAJOR FORCE BEHIND THIS CHANGE WAS SOME UNIQUE AMERICAN LEADERSHIP.

TODAY, AMERICA HAS BECOME ONE OF SEVERAL VERY LARGE AND DOMINANT COUNTRIES. IT IS VERY HARD FOR THE POLITICAL AND ECONOMIC DOOMSAYERS TO VIEW THIS TRANSITION AS OTHER THAN A DEFEAT FOR AMERICA, A DEFEAT AS WE SHARE STATUS WITH OTHER COUNTRIES.

TO THE CONTRARY, I VIEW IT AS AN EXTRAORDINARY SUCCESS. NO COUNTRY IN THE HISTORY OF THE WORLD HAS SUCCEEDED MORE COMPLETELY IN TRANSFERING THE VALUES OF BOTH ITS POLITICAL AND ECONOMIC SYSTEM AMONG OTHER COUNTRIES IN THE WORLD, AND HAS DONE SO IN AN ATMOSPHERE OF PEACE.

NOW, THAT WE ARE HERE, THERE ARE FEW ROADMAPS FOR HOW THE PROCESS CONTINUES FORWARD. HOW DOES AMERICA BEST USE HER ENORMOUS ENERGY AND RESOURCES TO ASSURE THAT THE WEST REMAINS

PROSPEROUS AND AT PEACE? HOW DOES THE UNITED STATES CONTINUE TO PROTECT HER OWN SECURITY INTERESTS AND AT THE SAME TIME AVOID ISOLATING HERSELF FROM THE INTERESTS AND NEEDS OF OTHER COUNTRIES?

SOME SAY THAT RECENT SOVIET INITIATIVES TO REDUCE BOTH STRATEGIC AND CONVENTIONAL WEAPONS OFFER AN OPPORTUNITY TO CUT DEFENSE IN A MAJOR WAY.

I VIEW THE SOVIET UNION WITH SOME AMBIVALENCE. IT IS ABSOLUTELY CLEAR THAT IT IS ECONOMIC LIMITS -- NOT MILITARY STRATEGY OR GOODWILL -- THAT HAS BROUGHT THE SOVIET UNION TO THE BARGAINING TABLE, AND WILL KEEP HER THERE. THAT DOESN'T LEAD ME TO ANTICIPATE THERE WILL BE MAJOR CHANGES SOON IN ANY REALISTIC DEFINITION OF THE SOVIET "THREAT".

ON A SECOND POINT, THERE ARE OTHERS WHO ARGUE THAT THE UNITED STATES SHOULD SHIFT MORE OF THE MILITARY BURDEN TO OTHER INDUSTRIAL COUNTRIES. IT IS IMPOSSIBLE TO ARGUE AGAINST THE NOTION THAT THE MILITARY BURDEN SHOULD BE "FAIRLY" SHARED.

YET, IT SEEMS IMPOSSIBLE TO DEFINE "FAIR". HAVING SET SOME STANDARD OF CONDUCT, IT IS UNCLEAR TO ME HOW WE GET OTHER COUNTRIES TO GO ALONG.

I HAVE A TABLE HERE THAT COMPARES THE BUDGET DEFICITS OF THE MAJOR NATO COUNTRIES AND JAPAN. THE UNITED STATES, WITH A

DEFICIT OF ABOUT 3 PERCENT OF GNP, FALLS SOMEWHERE IN THE MIDDLE.

CANADA AND JAPAN HAVE DEFICITS -- MEASURED AS A PERCENT OF GNP -- HIGHER THAN THE UNITED STATES, WHILE FRANCE AND GERMANY HAVE DEFICITS THAT ARE LOWER. WHATEVER THE COMPARISONS, IT IS CLEAR THAT NO COUNTRY IS AWASH IN RESOURCES FOR INCREASING ITS COMMITMENT TO NATIONAL SECURITY.

IT SEEMS TO ME THAT, IN THE CONTEXT OF EITHER A CHANGING SOVIET STANCE OR OUR RELATIONSHIPS TO OUR FREE WORLD ALLIES, PRESIDENT BUSH'S DEFENSE BUDGET IS A PRUDENT AND A MODERATE RESPONSE.

THE PRESIDENT PROPOSES TO RETAIN THE CURRENT PROGRAM LEVEL, AND THEN INCREASE IT AS WE MAKE PROGRESS ON THE DEFICIT.

THIS SEEMS TO ME TO BE A MINIMUM. I HOPE YOU WILL ADDRESS THE EXTENT TO WHICH YOU SHARE THIS VIEW.

I ALSO HOPE THAT YOU WILL GIVE US SOME IDEA OF THE AREAS IN WHICH WE WILL HAVE TO MAKE CUTS IN THE DEFENSE BUDGET, EVEN TO REMAIN WITHIN THE LIMITS OF THE PRESIDENT'S BUDGET PROPOSAL.

AND, FINALLY, I HOPE THAT YOU WILL SHARE WITH THIS COMMITTEE SOME OF YOUR OWN THOUGHTS ON JUST WHERE THE WORLD'S POLITICAL BALANCE IS HEADED, AND HOW WE SHOULD SHAPE OUR CURRENT DEFENSE EFFORTS TO PREPARE FOR THE FUTURE.

Table A16. Major Industrial Countries: Central Government Fiscal Balances and Impulses, 1980–89[1]

(In percent of GNP)[2]

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Fiscal balance *(+ surplus, – deficit)*										
Canada[3]	-3.4	-2.1	-5.4	-6.2	-6.8	-6.7	-4.9	-4.3	-3.4	-3.5
United States[4]	-2.3	-2.4	-4.1	-5.6	-5.1	-5.3	-4.8	-3.4	-3.2	-2.9
Japan[5]	-6.2	-5.9	-5.9	-5.6	-4.7	-4.0	-3.3	-3.8	-3.4	-3.2
France[6]	-1.1	-2.6	-2.7	-3.2	-3.3	-3.3	-2.8	-2.3	-2.0	-1.8
Germany, Fed. Rep. of[7]	-1.9	-2.5	-2.4	-1.9	-1.6	-1.3	-1.2	-1.4	-2.0	-1.4
Italy[8]	-9.4	-11.0	-13.0	-14.0	-13.2	-13.7	-12.2	-11.7	-11.2	-11.1
United Kingdom[3]	-2.5	-2.8	-2.7	-3.3	-3.1	-2.4	-2.2	-1.5	-1.2	-1.2
Seven major countries above	**-3.3**	**-3.6**	**-4.6**	**-5.4**	**-5.0**	**-4.9**	**-4.3**	**-3.6**	**-3.4**	**-3.2**
Seven major countries except the United States	-4.1	-4.5	-5.0	-5.2	-4.9	-4.5	-3.9	-3.8	-3.6	-3.4

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[1] Composites for the country groups are weighted averages of the individual national ratios for each year, with weights proportionate to the U.S. dollar value of the respective GNPs in the preceding three years.

[2] Canada, France, Italy and the United Kingdom : in percent of GDP.

[3] Data for Canada and the United Kingdom are on a national income accounts basis.

[4] Data for the United States are on a unified budget basis.

[5] Data for Japan cover the consolidated operations of the general account, certain special accounts, social security transactions, and disbursements of the fiscal investment and loan program (FILP) except those to financial institutions. Japanese data other than FILP transactions are based on national income accounts.

[6] Data for France are on an administrative basis and exclude social security transactions.

[7] Data for the Federal Republic of Germany are on an administrative basis and exclude social security transactions.

[8] Data for Italy refer to the state sector and cover the transactions of the state budget as well as those of several autonomous entities operating at the same level but do not include the gross transactions of social security institutions, only their deficits.

Data from 1980 are not comparable with those for 1979 because they are based on a recent revision of the national income accounts.

The fiscal impulse estimate of the April 1987 *World Economic Outlook* is shown for the transitional year 1980.

Source: IMF *Economic Outlook*, 1988.

Chairman Sasser. We will turn, now, to Acting Secretary of Defense Taft for any statement he might wish to make.

STATEMENT OF WILLIAM H. TAFT IV, DEPUTY SECRETARY OF DEFENSE

Mr. Taft. Thank you very much, Mr. Chairman. It is a pleasure to appear before this committee with Admiral Crowe. I have a statement which I would like to have submitted for the record, and if you permit me, I would just like to quickly summarize what is in that for the committee, and then Admiral Crowe has a statement as well.

Chairman Sasser. Your entire statement will be included in the record, Mr. Secretary.

Mr. Taft. Thank you very much, Mr. Chairman, and thank you also for your kind words. We have had a lot of help in the Department, not least from Admiral Crowe, and I think things are proceeding well under the circumstances. We look forward to our new Secretary's arrival.

Very quickly to summarize, Mr. Chairman, we have had, over the last 9 years, a significant build-up in the defense capabilities of the armed forces. We needed this very badly. Starting in 1979, some of the members of this committee were very much responsible for starting that build-up, and for maintaining the support for it.

It has improved our defense capabilities in terms of our readiness, our modernization, and, in some degree, particularly in the Navy, in our force structure, where the Navy had become far too small at the end of the 1970's and it is larger today.

This has been a bipartisan effort which has had the support, as I say, of both parties in the Congress, particularly in the first half of the decade. Much of the work that was done then, and the appropriations that were made then, are still delivering equipment to the armed forces today, so that we continue to enjoy the benefit of that.

At the same time I should say that the threat from the Soviet Union to which we must address ourselves remains considerable. Indeed, it, too, has grown over that period, not diminished.

We do have, as you have pointed out, and as everybody is well aware, promising developments, particularly on the rhetorical side, expressions of intentions by the Soviet Union to reduce their forces in Western Europe—or Eastern Europe. We have promising developments in INF, where we have the treaty in place, in the START talks, and others. There are some promising developments elsewhere, in terms of the Soviet Union, and, as I say, expressions of their intentions.

What we do not have, at this point, and what we must be, particularly in our business, very alert to, is any actual reductions—aside from the INF treaty, I should say—but aside from that—in the size of the Soviet forces, nor do we have any reduction in their capabilities.

Indeed, to the contrary, they are far more modern today than they were 9 or 10 years ago. Nor do we have any reductions in the production of military equipment by the Soviet Union that we can point to at this stage. Tanks, artillery, planes, and submarines continue to roll off the production lines, more modern than the ones that they replace in the Soviet inventory.

Now we must counter these capabilities of the Soviet Union while we watch and review their intentions. But it is the capabilities of the Soviet Union that must dominate our thinking at this point, in terms of meeting any threat that they might pose to our security or the security of our allies.

Our alliances and our defense programs are sized to meet those capabilities. The intentions can change overnight. Speaking of the allies, Mr. Chairman—and you and I have worked closely together over the last years on this subject—let me say there is no question in my mind that the allies can do more.

You mentioned Japan. They can do more. Indeed they are planning to do more, and they have been increasing their defense budget over the last years, and their plan is to continue that.

Our European allies can do more than they have in mind now, and we must urge them to do that. A significant contribution to global security would result if each of the allies would make a stronger effort.

This is not to say, however, when the total allied effort, including our own, is not adequate, that the United States should do less. We are not in a position as an alliance, as a whole, where enough is being done. We have gaps that our military leaders have been drawing to our attention for many years, which will be remedied if the allies do more. But if we do less, at the same time other gaps will open up.

So I certainly support the efforts, and I have been a part of the efforts that have been going on over the last year to get the allies to do more. I do not find these to be a substitute for our own efforts.

REAL GROWTH IN DEFENSE BUDGET AUTHORITY

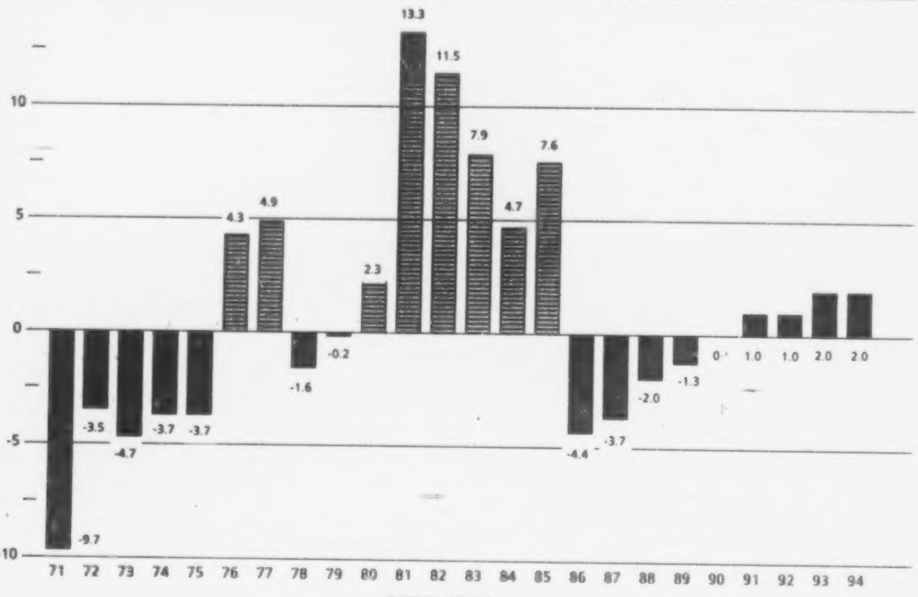


Chart 1

Today, of course, we in the United States are doing less than we were 4 years ago, and the first chart that we have here shows that. If you look at those four red lines towards the right, that shows the reduction in the defense program over the last 4 years. This is the pattern of real growth, or real decline in the defense program.

What that shows is that through fiscal 1989, the year we are now in, our defense program has declined to some 11 percent smaller than it was in fiscal 1985. That has been what has been happening to our defense program.

The President's proposal is to put a stop to those red lines in fiscal year 1990, not start a build-up, but call a halt to that decline at a real program that is the same in fiscal 1990 as it was in fiscal 1989, and then to resume modest growth in 1991, 1992, 1993, and 1994, which are those blue growth columns to the right of the chart.

FY 1990/FY 1991 DoD BUDGET
(Current $ Billions)

	1989	1990	1991	1992	1993	1994	CUM 90-94
BUDGET AUTHORITY							
Reagan Budget	290.2	305.6	320.9	335.7	350.7	365.6	1,678.5
Delta	-	-6.3	-9.9	-13.7	-14.8	-15.8	-60.5
Bush Budget	290.2	299.3	311.0	322.0	335.9	349.8	1,618.0
OUTLAYS							
Reagan Budget	289.8	293.8	304.7	316.2	329.3	343.4	1,587.4
Delta	-	-2.6	-5.9	-9.4	-11.9	-13.9	-43.7
Bush Budget	289.8	291.2	298.8	306.8	317.4	329.5	1,543.7

Chart 2

This is the President's current proposal. Let me compare this in the next chart with the Reagan budget because this describes the task that we have in conforming to President Bush's proposal which is underway in the Department and the Administration today.

President Reagan's proposal, submitted in January, is the top line there. It provided for approximately 2-percent real growth in the defense program in each of the years of the 5-year plan. This would not get us back in real program to the 1985 level, but it would have been steady growth.

The Bush budget has the decrements, as shown, and a total, over the 5 years, of $60 billion in budget authority that we must take out of the Reagan budget that has been submitted to you.

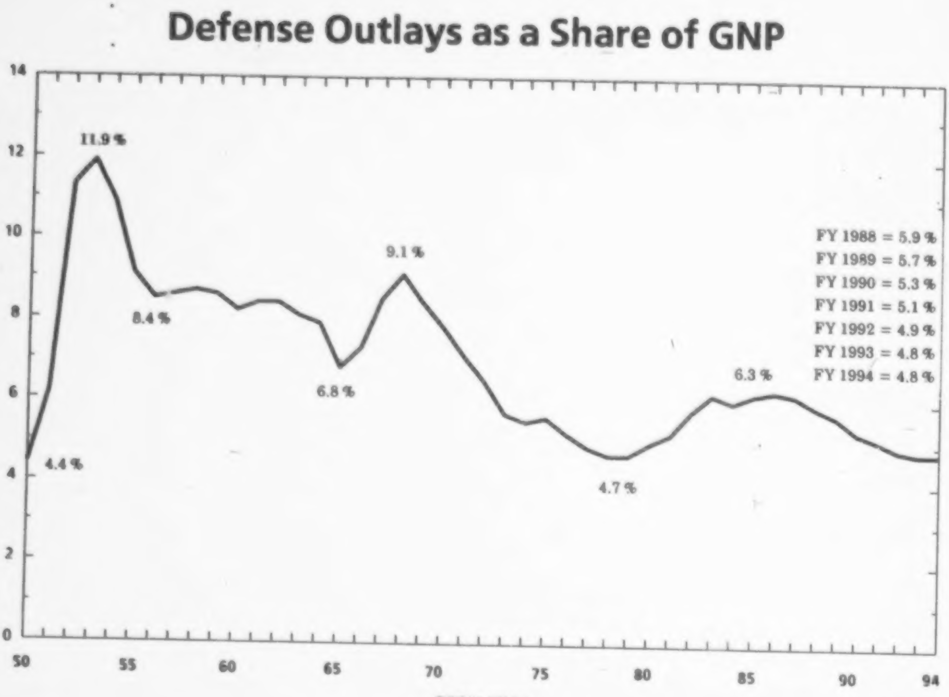
We are presently engaged in that exercise. It is a very difficult exercise for us to manage inasmuch as we have already taken significant reductions in the budget for these years, and it is with savings that we will be looking for, as well as program reductions, that we attempt to find those numbers and get up to the Hill with proposals.

Chairman SASSER. Would you hold that chart there for just one second, Mr. Secretary. I think he is getting ready to take it down. I would like to study it for one moment.

Thank you very much.

Mr. TAFT. That is the work program that the Department, right now, has in front of it, is to make those reductions.

If I may just speak generally, and to the next chart, of this budget level that is proposed by President Bush, I want to say that this proposed level of defense spending is easily affordable by this country.



Defense Outlays as a Share of GNP

Chart 3

Defense spending under this program will account for 5.3 percent of GNP in fiscal year 1990, and for 5.1 percent in fiscal year 1991.

Although the Bush budget proposes some real growth for defense after fiscal 1990, only 4.8 percent of GNP would go to defense in the fiscal year 1993. That is just above the 1978 and 1979 levels of 4.7 percent which were the lowest levels in the last half of the 20th Century.

I know some members of this committee, Senator Domenici, Senator Hollings, were very instrumental in starting the reaction to those levels in 1978 and 1979. We are back there, again.

It seems to me that the country's political leadership ought to be able to balance the budget when defense spending is held to that level.

The closer question, indeed, would appear to be whether the Congress and the Department will manage the defense program efficiently enough to meet our security requirements within these budget levels.

However that may be, the contribution that the defense program has already made to deficit reduction should not be overlooked by this committee.

From fiscal year 1987 to the proposed budget for fiscal year 1990, defense spending will have fallen, as chart 3 shows, 0.9 percent of GNP, from 6.2 percent to 5.3 percent.

This accounts for more than half of the drop in the deficit's share of GNP over that period. The deficit fell from 3.4 percent to 1.7 percent. That is to say, reductions in a quarter of the budget, defense spending, account for more than half of the progress that we have made on the deficit in the past 3 years.

Revenues contributed some of the rest. So the other three-quarters of the budget was only contributing a little bit over a third to the solving of this deficit problem in the past 3 years.

Let's have the next chart here.

Senator Simon. Before you move that chart, if I could, Mr. Chairman, does that reflect the unified budget in the pre-1969 figures?

Chairman Sasser. Can you see the chart from where you are sitting, Senator Simon?

Senator Simon. I have it in my——

Chairman Sasser. I see.

Mr. Taft. Yes, sir. This is totally consistent with the way it is presently done. Actually, this is just defense outlays as a share of GNP, so there is nothing about the unified budget.

Senator Simon. Oh, OK.

Mr. Taft. But as a share of the budget, we are now 25 percent of the unified budget.

Senator Simon. OK.

FY 1990 BUDGET LEVELS

(Dollars in Billions)

		% REAL	REDUCTION	
PRESIDENT's BUDGET	REQUEST	GROWTH	ANNUAL	CUMULATIVE
FY 1986	477.7	4.8		
FY 1987	374.7	2.8	-103.0	-103.0
FY 1988	343.9	3.0	-30.8	-133.8
FY 1989	307.3	2.1	-36.6	-170.4
FY 1990	305.6	2.0	-1.7	-172.1
FY 1990 Amended	299.3	0	-6.3	-178.4

Chart 4

Mr. Taft. This is the task that confronts us in putting together President Bush's budget. You can see what has happened to fiscal year 1990 over the past 4 years.

We proposed levels for fiscal 1990 first in the 5-year plan submitted in 1986 at $477 billion. We have brought it down, by January of this year, to $305.6 billion. We are now under the task of bringing it to $299.3 billion.

In the course of this reduction in fiscal year 1990, we have reduced, significantly, the force structure that was planned. We have cut back on some vital readiness training. We have cut back on sustainability, on procurement, on research and development, and on military construction.

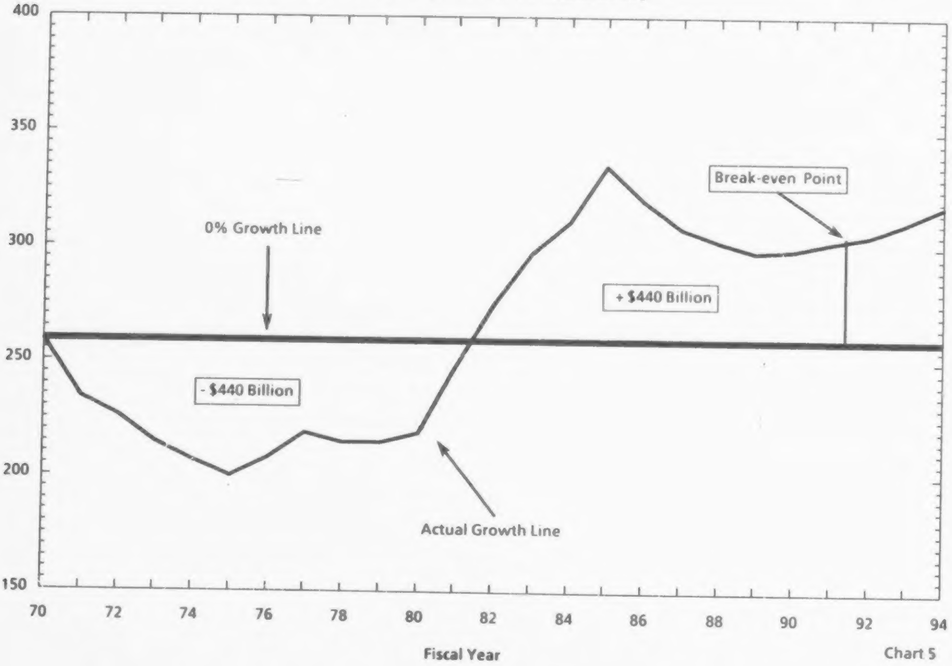
You cannot reduce the budget by $178 billion and not affect virtually everything that was in it. As we go, this remaining $6 billion, all of those same items, and particularly I would say force structure will be under intense pressure.

Let me say just a word about management, Mr. Chairman. The President has instructed us to do a management review in the Department, and we are undertaking that.

And the President, indeed, conditioned his proposal for a $6 billion cut in the 1990 budget on the Congress and the administration joining together to initiate management savings in the Department.

Many of these management savings are included in the Packard Commission recommendations. They involve multi-year programs. They involve buying off the shelf, economic order quantities, and particularly important to this committee, they involve stable budgets.

DEPARTMENT of DEFENSE BUDGET AUTHORITY
(FY 1990 DOLLARS IN BILLIONS)



This chart shows one of our problems in trying to keep the budget stable. If we had from 1970 to 1991, a completely stable budget, just flat, that zero growth line, we would have appropriated the same amount of money for defense as we in fact have appropriated, but we have not appropriated it that way.

We appropriated, over the first 11 or 12 years of that period, $440 billion less than zero growth would have given us, and over the remaining 9 years about $440 billion more than that growth pattern would have given us.

This is not a smart way to manage the defense program. If we had known that this was going to be our funding level, we could even have managed it better than we did, because it is the course of arriving at these levels, year by year, and changing them that makes it even more difficult to manage the program smartly.

We have started programs which we have had to cancel. We have built in force structure which we have had to take out, we have had difficulties, and what we need is fixed 5-year commitments on the defense budget. We need biennial budgeting in the Congress to stop this type of roller coaster. We are on this roller coaster month to month as we are running our programs, and the Congress is reviewing them and changing them, up and down, and we are trying to manage them.

That is a real problem for us. So that is about all I have to say, Mr. Chairman. I have focused a great deal on what really is called mathematics here, and if I could, I would just like to say that this is unfortunate, that I have had to do this, and it is unfortunate that the defense budget has, in recent years, come to be a function of mathematics.

We talk about real growth, and we talk about real freezes. We talk about shares of the budget, and we talk about shares of GNP. And it is all as if a third grade math student could be the Secretary of Defense or the Chairman of the Joint Chiefs of Staff.

There is a part in James Joyce in Ulysses, Mr. Chairman, where Steven Daedelus says that he is going to prove by algebra that Hamlet is his own grandfather. This is very funny, but the fact is that even if it were true, you could not prove it by algebra.

You cannot provide for the security of the United States by mathematics. It is for that reason that I am delighted to have with me the Chairman of the Joint Chiefs of Staff, and he is going to be talking about the program, the threat, and the real challenge to you and to the American people.

Thank you, Mr. Chairman.

Chairman SASSER. Thank you, Mr. Secretary.

[The prepared statement of Secretary Taft follows:]

STATEMENT OF
THE DEPUTY SECRETARY OF DEFENSE

WILLIAM H. TAFT, IV

BEFORE THE

SENATE BUDGET COMMITTEE

IN CONNECTION WITH THE
FY 1990/FY 1991 BUDGET
FOR THE DEPARTMENT OF DEFENSE

MARCH 14, 1989

STATEMENT OF THE DEPUTY SECRETARY OF DEFENSE BEFORE THE SENATE BUDGET COMMITTEE IN CONNECTION WITH THE FY 1990/FY 1991 BUDGET FOR THE DEPARTMENT OF DEFENSE

Introduction

Mr. Chairman, Members of the Committee:

Eight years ago there was bipartisan consensus to reverse the trend of deep reductions in defense spending which had begun to threaten military preparedness. Together we have successfully restored the readiness and sustainability of our military forces and begun a long-term program of force modernization to meet the future challenges to our national security.

Today, after 8 years and a considerable investment of resources, we can all be proud of these accomplishments. We have improved almost every aspect of our military forces. The men and women now serving in our active and reserve forces are capable, motivated, and highly trained. Our maritime forces are strengthened and revitalized, while expanded Special Operations Forces are capable of conducting missions around the globe. Strategic forces have been modernized and our command and control systems are better able to provide a more stable and credible deterrent. Well-equipped ground and tactical air forces have the technological edge needed to offset the marked numerical superiority of improved Soviet forces. Our national confidence and defense capability, which had languished during the 1970s, have been restored and revitalized. Our policy of negotiating from strength has helped to restore international respect for the United States, strengthen our alliance partnerships, and maintain momentum in the negotiations on Strategic Arms limitations.

The underlying tenet of our defense policy has not changed since the end of World War II. Our national security objective is the protection of the United States as a free nation with its fundamental institutions and values intact. The major military threat to the security of the United States and its allies and friends is posed by the Soviet Union. Even though the Soviet leadership publicly expresses a new commitment to peace and has recently announced military reductions, there has been no clear move to reallocate resources from military investment to reinvigorate a faltering Soviet economy. We cannot ignore the continuing Soviet arms buildup, which has resulted in a wide advantage in their favor in most categories of conventional weapons. For example, from 1979 to 1988, the Soviet Union produced 26,000 tanks compared to 7,400 produced by the United States. There is no reason to believe that this pace of Soviet weapons production either has changed or will change markedly in the near future.

Peace through strength remains the best deterrent to aggression. Together with our allies, we seek to achieve this objective by convincing potential adversaries that the cost of initiating aggression will outweigh any possible benefit. Our national strategy relies on our allies' major contributions to collective security and allied defense commitments. Because of a strong NATO alliance and through treaties with Japan, South Korea, the Philippines, Thailand, Australia, and other allied nations, we are able to achieve a level of deterrence and defense that would otherwise be unattainable.

What is needed in today's changing world of emerging new economies, glasnost, and fast-paced technological change, is a common sense, objective evaluation not only about the threats that face us but also about our relations with our allies. During the past year, I have served as the head of a special interagency burdensharing task force. I have met directly with our principal allies in Europe and Asia on the question of how we and our allies can best share the roles, risks, and responsibilities within our alliances. Our message to each ally is clear: we must find the resources, through better management and ultimately through funding increases, to sustain the common defense and to strengthen our alliances through a progressive evolution of the common defense burden. Their response has been encouraging to this point, though more work needs to be done to assure a positive outcome.

By continuing to improve our security partnerships throughout the world, and encouraging our allies to share the burden of common defense, our combined strength will have significantly higher deterrent value than that of individual nations. Of course, it is very important in this effort to provide a good example by maintaining our own defense and security assistance levels. If our strategy is to be successful, we must have the ability to counter and meet threats of force at every point, from individual acts of terrorism to all-out nuclear war. President Bush has reaffirmed his commitment to maintaining a strong defense.

Preserving Defense Capabilities

Yet despite the strong foundation built from 1980 to 1985, progress has more recently been slowed and, in some cases, reversed by 4 years of declining growth in congressionally approved funding levels. In addition to the reductions made by the Administration in efforts to lower the federal deficit, the Congress cut the defense budget request for FY 1986 through FY 1989 by $117 billion, resulting in a cumulative decline of over 11 percent in real terms. This represents a serious loss of security and capability. Many of the problems that threatened our readiness and modernization during the 1970s have begun to reemerge. Our forces have also been reduced in size. If this trend continues, it will be only a matter of time before we will again have a force structure insufficient to meet the requirements of our military strategy and be faced with a costly rebuilding effort.

(CHART 1 -- REAL GROWTH IN DEFENSE BUDGET AUTHORITY)

Between 1985 and 1989, most of the emphasis in the congressional budget review was placed on cutting current-year defense requirements. Each year was reviewed in isolation, not in the context of longer term objectives. This forced DoD to make decisions that led to disjointed long-term resource allocation. Such decisions jeopardized our modernization program, threatened to undermine the gains we had achieved in improving our readiness, and heightened the possibility of a return to a "hollow" force unable to meet its missions.

After the budget summit agreement, in connection with which DoD made the latest of a series of significant contributions to deficit reductions, we saw an opportunity to set the stage for a period of stability in defense funding. Priorities were established which altered the long term approach to meeting our defense requirements, and the adjustments necessary to accommodate the budget summit reductions were made by altering force structure and modernization goals. We tried to balance our missions with our force capabilities and secure sufficient funding to support them. That effort was supported overwhelmingly by the Congress in their review of the FY 1988 and FY 1989 budgets. It was this bipartisan support which led to the development of the resources necessary for the FY 1990/FY 1991 biennial budget and the FY 1990-1994 long-term program.

FY 1990/FY 1991 Budget

The budget presented by President Reagan in January provided for 2 percent real growth and requested budget authority of $305.6 billion in FY 1990 and $320.9 billion in FY 1991.

(CHART 2 -- FY 1990/FY 1991 AMENDED DoD BUDGET)

Although President Bush supports the policies on which the Reagan budget was built, the current economic environment has necessitated a reevaluation of the funding requested. President Bush has agreed to a one-year freeze in real growth for defense, on the condition --and this is important-- that this reduced defense spending level is part of a comprehensive plan to meet Gramm-Rudman-Hollings targets and incorporates reforms which bring stability to the budget process. Real increases of 1 percent in FY 1991 and FY 1992 and 2 percent in FY 1993 have been proposed.

The amended budget requests budget authority of $299.3 billion in FY 1990 and $311.0 billion in FY 1991. Outlays are projected at $291.2 billion in FY 1990 and $298.8 billion in

FY 1991. This represents a reduction in budget authority of $6.3 billion in FY 1990 and $9.9 billion in FY 1991.

(CHART 3 -- DEFENSE OUTLAYS AS A PERCENT OF GNP)

This proposed level of defense spending represents an affordable share of our nation's resources. Defense spending will account for 5.3 percent of the Gross National Product (GNP) in FY 1990 and 5.1 percent in FY 1991. Although the Bush budget proposes some real growth for defense after FY 1990, only 4.8 percent of GNP would go to defense in FY 1993, just above the 1978 and 1979 levels of 4.7 percent--the lowest levels in the last half of the twentieth century.

It seems to me that the country's political leadership ought to be able to balance the budget when defense spending is held to this level. The closer question, indeed, would appear to be whether the Congress and the Department will manage the defense program efficiently enough to meet our security requirements with these budgets. However that may be, the contribution that the defense program has already made to deficit reduction should not be overlooked by this committee. From FY 1987 to President Bush's proposed FY 1990 budget, defense spending will have fallen 0.9 percent of GNP, from 6.2 percent to 5.3 percent. This accounts for more than half the drop in the deficit's share of GNP, from 3.4 percent to 1.7 percent. That is to say, reductions in a quarter of the budget, defense spending, account for more than half the progress we have made on the deficit in the past three years.

(CHART 4 -- FY 1990 BUDGET LEVELS)

I have asked the Military Departments and Defense Agencies to submit their proposed reductions to achieve the levels set by President Bush. The OSD staff and the Commanders-in-Chief of the Unified and Specified Commands are currently reviewing the Service recommendations.

The magnitude of the reductions that have already been made to the FY 1990 budget plan underscore the difficulty the Military Services have in accommodating these latest adjustments. Since it was first prepared as part of the 1986-1990 FYDP, over $178 billion has been cut from the FY 1990 budget. Therefore, you can understand our concern that there might be anything less than full congressional support for the amended FY 1990/FY 1991 budget that President Bush proposed.

There are no "good" or easy choices that can be made to accommodate the reduction proposed by President Bush for FY 1990-FY 1993. We plan to achieve a reasonable and affordable program, balanced between manpower, force structure, readiness, procurement, research and development, and military construction in order to maintain long-term national security goals without increasing risk to an unacceptable level.

Total Active military end strength is lower than it was in FY 1988. Further reductions in strength would make it extremely difficult to man effectively even our reduced force structure and would require adjustments to that structure. The manpower reductions we have already made required significant alteration to our force structure goals. Specifically, the Navy's goal of 600 ships has been delayed indefinitely, Air Force and Navy Tactical fighter wings have been reduced from 1987/1988 levels, and the Army has deactivated some units and cancelled the planned activation of others to maintain a balance within its existing structure. Significant reductions below these levels would create weaknesses in our restructured balanced forces.

A force equipped and ready to meet the requirements of its mission is key to the effectiveness of our military forces. While reductions to the operations and maintenance accounts and other areas that directly affect readiness and sustainability may seem attractive due to the rapid spend-out rates which could produce attractive outlay "savings" compared to the slower spending procurement accounts, these reductions in flying hours, training days, spare parts and munitions will cost us dearly in the long term. Further reductions to our already minimal training levels would significantly degrade the readiness levels of our forces, inhibiting severely our ability to respond to emergency situations.

The key to an efficient and effective procurement program is a sustained commitment to multiyear procurement and economic rates of production. The FY 1990/FY 1991 budget contains a substantial increase in the Multiyear Procurement Program and budgets most major systems at economic production rates. Reductions in procurement would be counterproductive to this effort as efficiencies to be gained through planned economic production rates would be lost, program costs would increase, delivery schedules would slip, and quantities would be reduced.

Our ability to meet future threats to our security depends on a sustained and consistent research and development program leading to the production and deployment of technologically advanced weaponry. Without such a program, we will not be able to maintain the technological advantage that has enabled us to support our deterrent strategy in the face of quantitative disadvantages in some areas.

Finally, a sustained construction program is necessary for the support of our existing force and the successful deployment of future systems. Continued improvements to the housing and support facilities for our personnel are an important component of our quality-of-life program. However, when reductions have been required in the past, it seems the military construction accounts are the first to be cut. Further reductions to military and family housing construction will undercut the necessary support facilities for our forces and undermine the significant improvements we have made in recruiting and retention of military personnel.

If we continue the trend of the past few years of developing long-term plans that provide for growth and then, during the congressional budget review, the current budget year requests are cut so as to provide for negative growth, we continually disrupt the defense planning and programming process and add significantly to the cost of defense. The result is a long-term period of sustained decline in defense capabilities. Even worse, we may lose control of our long-term planning process and endanger our ability to rebuild our capabilities effectively in the face of a crisis.

Managing Defense Resources

President Bush has reinforced our commitment to streamlining the defense management and acquisition process to achieve greater savings through more efficient and effective operations. He has called for full implementation of the recommendations of the Packard Commission and the Goldwater-Nichols Act. He has asked the Department to eliminate unnecessary layers of bureaucracy, improve the quality of defense personnel at all levels, and eliminate or defer lower-priority programs. In addition, DoD is also charged with developing a plan for more efficient acquisition practices, such as streamlining defense regulations and laws, and using more commercial-style competition, off-the-shelf systems and subsystems, and services available in the private sector. Finally, President Bush has asked the Congress to share in the reform process by streamlining its procedures of oversight and budgeting, including more efficient practices such as two-year budgeting and multiyear procurement.

(CHART 5 -- DoD BUDGET AUTHORITY (ZERO GROWTH LINE))

In the current political and economic environment, getting the most defense from limited resources will become our first priority. A stable defense level, biennial budgeting, multiyear procurement, and economic production rates will provide for efficient planning and allocation of resources. Erratic changes in defense funding over the past 20 years have led to substantial inefficiencies in program execution. If we had merely maintained spending at a level which kept pace with inflation over the last 20 years, we would have had a larger and more efficient defense program than the one attained under this erratic funding pattern.

Although the first biennial budget was not acted upon in its entirety by the Congress, it has proven invaluable as a tool for effective planning within the Department of Defense. Approval of biennial budgets could provide the resource stability necessary for economical program execution. The recent introduction of a proposed Biennial Budget Act, Senate bill S.29, is a promising step toward adoption of a biennial process.

Effective management, quality performance, and affordability of defense acquisition are also key to the decision-making process. We must continue our efforts to simplify our internal processes as well as the complex congressional budget process. Timely and responsive congressional action is essential to stability and predictability in defense funding. It is very encouraging that the Congress was able to pass and send the FY 1989 Defense Authorization and Appropriation Bills to the President before the beginning of the fiscal year. However, the burdensome size of the congressional oversight structure has resulted in an increasingly time consuming process. Defense legislation has become laden with restrictions on subjects ranging from contracting procedures to obligation restrictions, as the Congress has sought to manage the funding and execution of our programs in more and more detail.

We need to build a process that employs sound business practices to ensure the stability of individual programs. We should be allowed to set our goals, have programs authorized to meet them, and be provided stable funding over the life-cycle of each program. Program stability contributes to reducing total program costs while facilitating long-range planning. It allows for firm development schedules, set specifications, and steady production rates.

Specifically, we must make greater use of Multiyear Procurement (MYP). MYP has yielded significant savings since its inception in 1981, through economical buys and by reducing the uncertainty inherent in single-year funding. MYP programs approved from FY 1982 through FY 1989 will produce savings of $9.0 billion. Although the specific reductions in the budget amendment have not been identified, I am committed to an aggressive MYP strategy.

There are some who would argue that the ongoing "Ill Wind" investigation would suggest that the defense budget can be reduced without unacceptable impact simply by correcting the problems which have surfaced. Information made available at this time has not identified large dollar saving opportunities, though it has suggested important steps for improving our business practices and ethics. We recover, of course, as a result of the investigation all lost funds, as well as criminal and civil penalties and the costs of our investigation. Civil penalties have been vigorously sought by the Department in recent cases. You may have heard of the $189.5 million payment required of the Sundstrand Corporation a few months ago.

As we review the successes of the last 8 years, with an eye toward protecting our gains, we have the opportunity to forge a new consensus between the executive and legislative branches on realistic and stable funding for defense programs. We need to work together to find fresh, progressive initiatives, similar to the recent base closure bill, which will help us redirect our scarce defense dollars to the most urgent requirements and productive activities.

Conclusion

Mr. Chairman and Members of the Committee, the FY 1990/FY 1991 defense budget reflects a careful balance of requirements against funding constraints. In partnership with the Congress, we can preserve our gains and continue to support a strong national defense. Stable and timely defense funding is the key to providing an adequate defense posture. We have taken some steps and I hope you will join us in our efforts to achieve this goal.

The suggestion of any rate of growth is arbitrary and confuses budgeting for defense requirements with budgeting to a prescribed dollar constraint. The budget submitted to the Congress just two years ago included an outyear plan of 3 percent real growth. The Congressional Defense Oversight Committees praised that budget as both "prudent and necessary." That "prudent" defense plan has been reduced by approximately $375 billion. In accommodating these reductions, we made some hard choices, and opted for a smaller ready force rather than a larger ineffective force. Unfortunately, these changes have forced us to accept a greater level of risk. How much more can be cut from the defense budget and the Five Year Defense Program (FYDP) before the attendant risks to national security become unacceptable and we fail to meet our commitments? I believe that we are approaching that point.

We must not lose sight of the fact that the defense budget is a security issue, and we must guard against complacency. We must rebuild the bipartisan consensus and proceed with a budget which will minimize further degradation to our national security.

REAL GROWTH IN DEFENSE BUDGET AUTHORITY

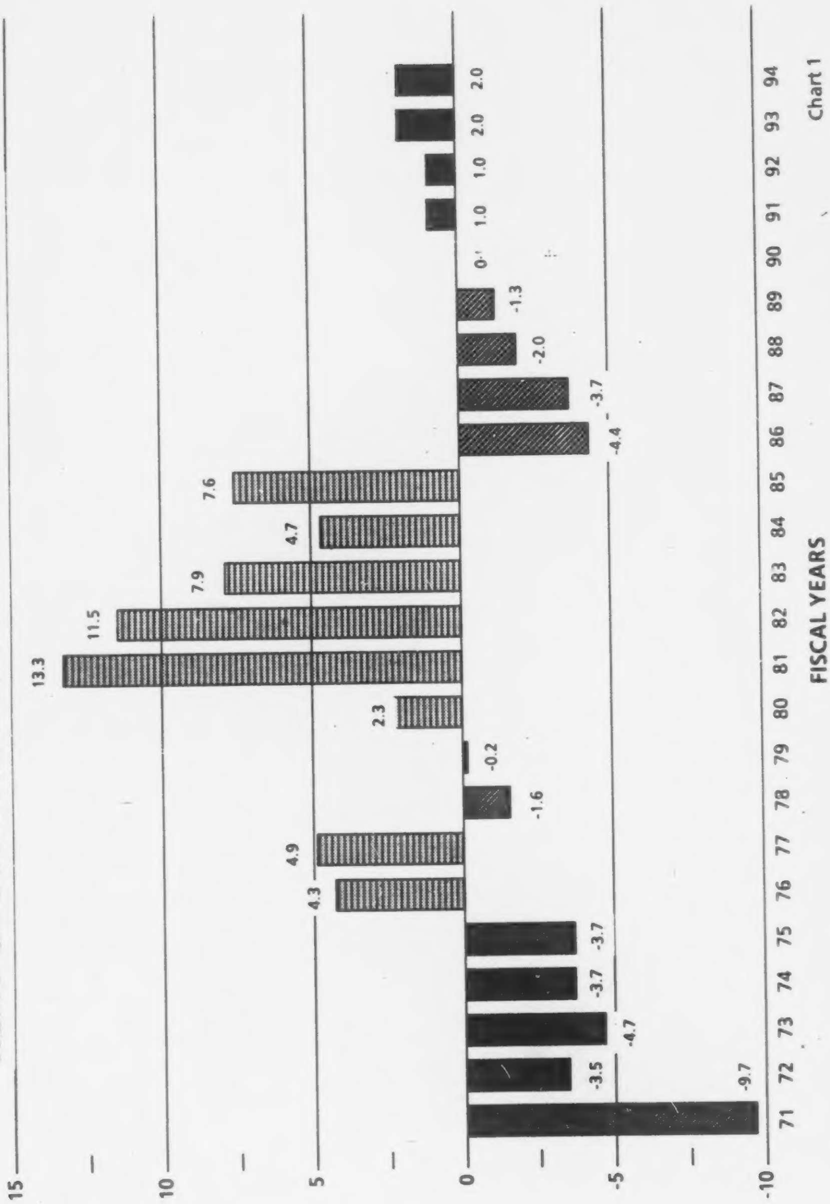


Chart 1

FY 1990/FY 1991 DoD BUDGET

(Current $ Billions)

	1989	1990	1991	1992	1993	1994	CUM 90-94
BUDGET AUTHORITY							
Reagan Budget	**290.2**	**305.6**	**320.9**	**335.7**	**350.7**	**365.6**	**1,678.5**
Delta	-	-6.3	-9.9	-13.7	-14.8	-15.8	-60.5
Bush Budget	**290.2**	**299.3**	**311.0**	**322.0**	**335.9**	**349.8**	**1,618.0**
OUTLAYS							
Reagan Budget	**289.8**	**293.8**	**304.7**	**316.2**	**329.3**	**343.4**	**1,587.4**
Delta	-	-2.6	-5.9	-9.4	-11.9	-13.9	-43.7
Bush Budget	**289.8**	**291.2**	**298.8**	**306.8**	**317.4**	**329.5**	**1,543.7**

Chart 2

Defense Outlays as a Share of GNP

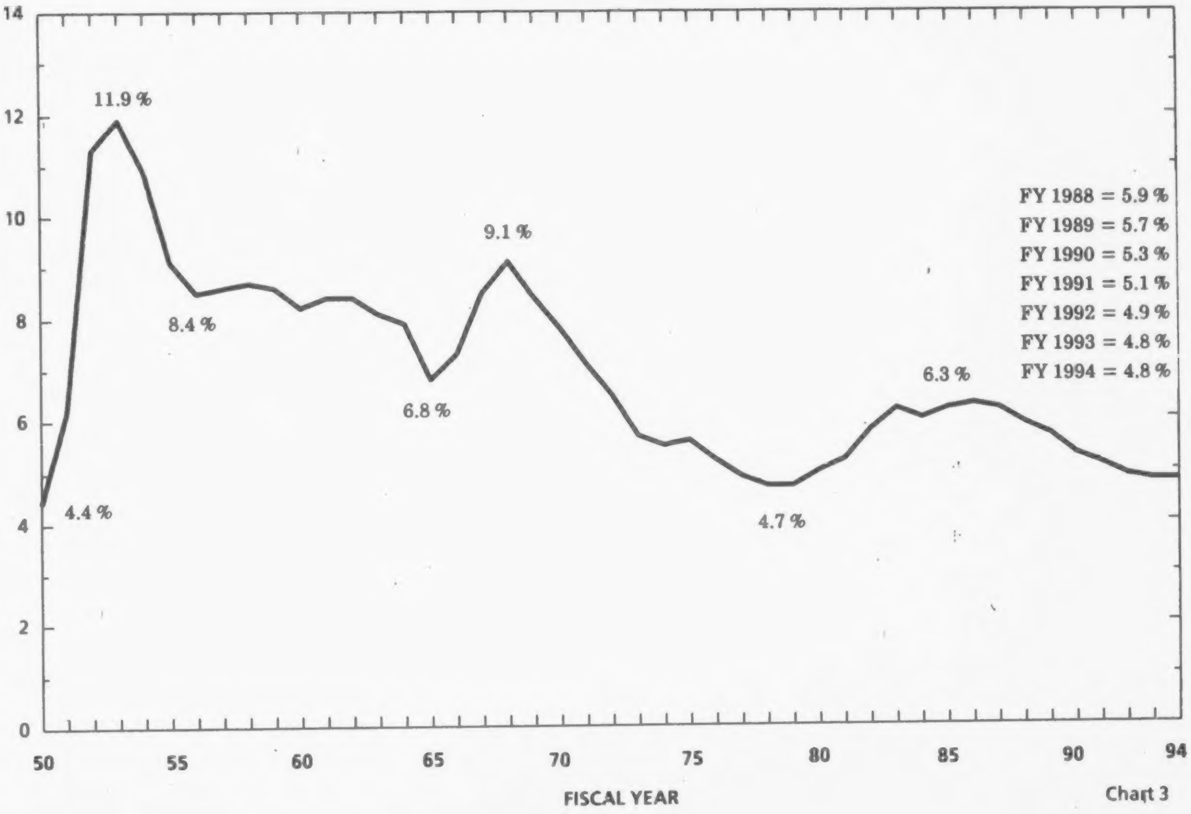


Chart 3

FY 1990 BUDGET LEVELS

(Dollars in Billions)

PRESIDENT's BUDGET	REQUEST	% REAL GROWTH	REDUCTION	
			ANNUAL	CUMULATIVE
FY 1986	477.7	4.8		
FY 1987	374.7	2.8	-103.0	-103.0
FY 1988	343.9	3.0	-30.8	-133.8
FY 1989	307.3	2.1	-36.6	-170.4
FY 1990	305.6	2.0	-1.7	-172.1
FY 1990 Amended	299.3	0	-6.3	-178.4

Chart 4

DEPARTMENT of DEFENSE BUDGET AUTHORITY
(FY 1990 DOLLARS IN BILLIONS)

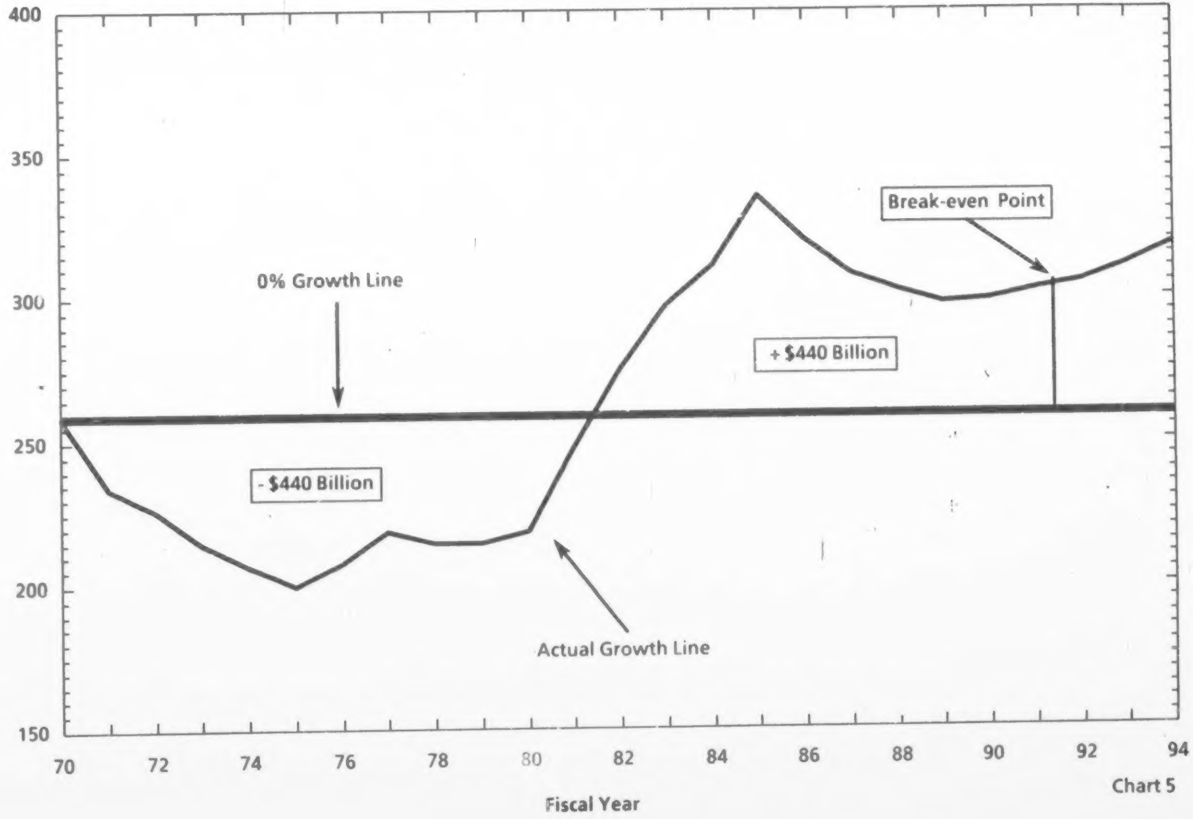


Chart 5

Chairman **Sasser**. We will turn now to Admiral Crowe.

STATEMENT OF ADM. WILLIAM J. CROWE, JR., USN, CHAIRMAN, JOINT CHIEFS OF STAFF

Admiral **Crowe**. Thank you, Mr. Chairman. I hope the Secretary was not saying that I cannot add two plus two. I do not know. [Laughter.]

I appreciate this opportunity to be here, Mr. Chairman, to participate in your hearing this morning. I have submitted a written statement for the record, and with your permission, I would like for it to be included in the record. It is my intention this morning only to highlight the major points of that statement. It will be a highly compressed version.

As has been my custom over the last 3 years, my statement essentially reviews the international political military situation and also gives an unclassified global overview of our military posture.

Let me say at the outset that I think the U.S. Government has seldom been engaged in a more complex array of international relationships and negotiations than it is today. In such an environment—and I believe that our experience bears this out—I see no alternative to the tried and proven formula of dealing from strength as we seek to secure our future.

My full statement first addresses the Soviet approach to military power in some detail. This committee is, of course, aware of the impressive strength the Kremlin has mustered over the last four decades, and that the USSR represents our most imposing potential adversary. Any U.S. military strategy must confront these realities.

It is true, of course, that we are witnessing a remarkable series of changes in Moscow. General Secretary Gorbachev has outlined in some detail the economic woes of the USSR. He has launched perestroika and glasnost in an effort to prepare his country for the next century. His policies, if carried to conclusion, could have profound implications, not only for his own nation, but also for Russian relationships with the free world.

If carried out, these Soviet decreases—and I am talking from a military perspective—will influence the balance of land power in Europe and Asia. Opposite NATO's Central Front, Warsaw Pact cutbacks could present a down payment on the less offensive posture and virtually eliminate the surprise attack option for Soviet ground forces. Perhaps even more important—although we have no concrete evidence that it is going to take place yet—but perhaps more important is the recent announcement of future slashes in production and redirection of military plants to civilian output.

For our part, however, I think it is imperative that we understand that, thus far, this is just rhetoric. We must in turn satisfy ourselves that these promises actually materialize. It is equally or perhaps even more important to understand that much of the global military picture will remain untouched even by these promises. And I am talking about the Russian space capability, their current strategic weapons inventory. And, frankly, these announcements do not begin to dent the overall superiorities which the Soviets enjoy in many categories, but especially in their ground forces.

My submitted statement then breaks down our global posture and addresses current defense issues. To preserve time, I will touch only on the more significant items.

First, maritime defense. On balance, I believe that we would fare well in a maritime contest with the Soviet Union. But such a confrontation will nevertheless require an all-out effort if we are to confine the Russian fleet to its home waters and to establish control over vital ocean lines of communications. The primary threat at sea is the Soviet submarine fleet, which presses the U.S. to stay ahead in the ASW race.

In other words, if we are going to handle that fleet, we must stay ahead. If we do not, we will not be able to deal with it.

In my view, the quality of our ships and aircraft and the exceptional caliber of our people provide us the overall edge. Our naval power will be vital in confining the Kremlin to a land campaign and in threatening the Soviets on a number of unpredictable axes.

Mr. Chairman, if I could diverge just for a moment, I would like to say that again: in confining the Kremlin to a land campaign and in threatening the Soviets on a number of unpredictable axes. I frankly had not given enough thought to that until I heard Marshall Akhromeyev talk. It is probably his number one concern. He is mesmerized, and with good reason, with our naval power. Similarly, of course, that strength facilitates communication with our allies and projection of our air and ground power in a major war, in limited hostilities, or in peacetime crises. And we have recently seen a graphic example of that in the Persian Gulf.

The Soviets do not enjoy this kind of flexibility. It would be folly to let our maritime capability degrade.

Strategic mobility: The United States is relatively well postured in terms of lift for contingency short of major war. Given a crisis involving NATO, however, and the Warsaw Pact, the Soviet Union would have an initial jump in reaching Western Europe. This, of course, is due to the short distances and the developed road and rail system in that part of Europe.

Similarly, Russian strategic airlift permits transferring people and light cargo between the European and Asian fronts, all within Soviet airspace.

The Kremlin also enjoys a peacetime advantage in merchant shipping, which can be easily commandeered by the government for military purposes. Once global hostilities commenced, however—and, again, our naval power would come into play—the Soviet merchant fleet would find itself bottled up in port and otherwise out of action. In contrast, we would have the use of the oceans but would still be at full stretch to reinforce Western Europe rapidly; fundamentally, a consequence of insufficient merchant bottoms, as well as the wide use of flags of convenience.

Looking ahead, if substantial force reductions are in the offing, our mobility assets would become even more crucial to our global posture.

Space: Both the United States and the USSR have fashioned a significant military capability in space. Moscow, as usual, favors numbers and size. We tend towards sophistication. It is vital to maintain robust space efforts, for it is the military wave of the future.

My chief concerns are the Soviet anti-satellite weapons which place some of our most important space resources in jeopardy, and also our ability to lift in a responsive fashion our own systems into space. We desperately need that latter capability, and, above all, we need our own ASAT as a counter and a deterrent.

Strategic nuclear forces: While each side uses a different approach, the U.S. and U.S.S.R. have a rough strategic parity. The Kremlin has fielded some impressive modern ICBM's, including two mobile variants, and puts emphasis on passive measures as well. In general, the larger size of the Soviet weapons gives them a megatonnage edge, but this means little in the overall nuclear calculus.

Washington has in train its own modernization effort. I am referring to D-5 missiles, Peacekeeper, B-2, et cetera. These improvements are imperative if we intend to keep pace with the Soviets, and especially if we want to move into a START regime.

Our most pressing current problem is to resolve a mobile missile issue and to move into development. Put simply, a healthy strategic deterrent is the foundation of our overall defense posture, and to see it degrade would be a grave mistake, in my view.

Conventional forces: The United States conventional strength around the world is relatively adequate to deal with a wide spectrum of peacetime crises and limited contingencies. The most stressful and worrisome challenge, however, would be full-fledged conflict with the Soviet Union and, in turn, the task of defending NATO Europe alongside our allies. If deterrence fails in Europe and the initial defense falters, the coalition will face the unpalatable prospect of losing considerable European territory, or, in the alternative, resorting to theater nuclear weapons. The latter is NATO policy.

But, frankly, the alliance is still not able to mount a well-founded conventional defense against a determined Soviet campaign. To avoid the nuclear prospect, nothing will substitute for such a capability; that is, large numbers of well-trained forces, modern weapons systems, adequate inventories of sophisticated conventional munitions, and sufficient combat logistic support.

Of great concern is the possibility that the coalition's members will not make the investments necessary to meet this challenge. Perhaps unilateral Soviet reductions or future negotiations will redress the balance, but it is much too early to rely on such predictions. Experience would argue that the best way to bring the Kremlin's leaders to the table is to enhance your own conventional strength.

The bottom line is that the United States cannot solve this problem alone. Without allied willingness to spend more, a successful conventional defense of Western Europe is, indeed, questionable. This lack is a significant weakness in our global security stance. This shortcoming does not necessarily mean that Europe is in immediate jeopardy. Deterrence has a number of elements besides local military strength. It does mean that if we are to confront steadily decreasing defense appropriations, we should look at all elements of deterrence and favor those with the highest payoff.

Having stressed the NATO area in order to note our most pressing military challenge, let me now comment briefly on the remaining regions of special U.S. interest.

East Asia and Pacific: In the Pacific, forward defense of the United States is bolstered by our alliance with Tokyo. In turn, we are committed by treaties to the defense of Japan and the Republic of Korea. To maintain a favorable balance of power in the region, we must be prepared to protect lines of communication to China as well as Southeast Asia.

Today, I judge the posture of U.S. and allied forces in the Pacific sufficient to deter the Soviets from a major attack in that theater, and, if deterrence fails, to secure our fundamental interests. North Korea still enjoys a marked advantage over the South in ground formations. The ROK, however, is well postured defensively and buttressed by the 2d U.S. Division.

More critical would be U.S. air in the Far East, which is positioned to render immediate assistance. It is very unlikely, in my view, that Pyon Yang would provoke this combination without support from the PRC or the Soviet Union.

Two words of caution are in order. First, Moscow has been steadily increasing the quality and quantity of its air and naval forces in the Pacific. Second, our basis in the Philippines are under considerable local political pressure. In short, our air and naval strength in the western Pacific is critical, and we must remain flexible on base options.

Southwest Asia: In that part of the world, U.S. security interests are tied closely to energy; namely, access to petroleum at reasonable prices. The Persian Gulf has more reserves than any other area in the world, and no producer can lift oil at less cost per barrel than Saudi Arabia and Kuwait.

Should the Soviet Union ever decide to co-opt the Gulf oil fields, we estimate they could overwhelm the regular forces of Iran, but the Kremlin always has to worry about what happens next. Our war gaming suggests, for example, that the Central Command can contest a Soviet advance in Iran and probably maintain some access to the Persian Gulf. When stiff resistance by the Iranians, a multilateral response by the West, and support from the Gulf Cooperation Council are added to the picture, the Soviets would be confronted with even more serious problems than they suffered in Afghanistan.

Latin and Central America, of course, present a little different problem. They are in the state of flux. The Arias Peace Plan was designed to bring democracy to Nicaragua, but until now, Managua has ignored this injunction. The burden of proof is still with the Sandinistas. They must renounce force if the area is to stabilize.

Meanwhile, the United States faces a crisis in Panama and sagging confidence in the leadership of the PDF. Concurrently, we are plagued with a narcotics problem that poses a threat, not only to the integrity and the stability of governments to our south, but to the social fabric of the United States as well.

Against this background, I would suggest that it is imperative that we keep our local strength ready and updated. I much prefer, however, to see a bipartisan agenda for the area and, above all, an enhanced security assistance program keyed to promoting stability and internal security and to helping these countries with their own local problems.

Secretary Taft has, of course, said a great deal about the budget. I would just like to add a few comments. America will enter the 1990's spending around 5 percent of its gross national product on defense. It seems to me that this is a rather modest investment of resources, considering the size of the product we receive, international conditions, the military threat, and our global interests, which are wide and broad.

Over the last 4 years, U.S. strategy has worked out a relatively reasonable balance between our various global responsibilities. In the process, however, our forces are tightly stretched, and for several years, the Chiefs have testified that we do have deficiencies, even at this level; and that the risk is higher than they would prefer. We are now at the point when even small cuts will translate into disproportionate reductions in capability and the level of our capabilities involve more risks than the Chiefs want or desire or think the leader of the free world should have.

Specifically, all of our active and Reserve forces will not be ready on an everyday basis to defend NATO, Southwest Asia, or the Pacific Far East against a major threat from the Soviet Union. In the unlikely event that deterrence fails and we engage the Kremlin worldwide, we will have to sequentially reinforce and defend the various theaters. We cannot defend them simultaneously.

On NATO's Central Front, we may be forced to trade space for time or to consider resorting to the use of nuclear weapons. Neither option is very palatable.

At the same time, the U.S. is challenged to maintain a credible nuclear deterrent, a secure position in space, a supportive maritime environment, and strategically mobile ground and air forces.

I have learned that within the last 2 years, even for small limited crises, the people of the United States expect the President to have the capability to deal with them quickly, effectively and without losing Americans. Given the fact that even small countries today have sophisticated weaponry, that is a demanding challenge.

We have had 4 years of negative growth and 11 percent cutback. Last year, we drew down combat units in every service, as Secretary Taft mentioned. We are now at the point where continuing negative growth will degrade, in my view, disproportionately our capability and our overall posture. It is a simple but fundamental fact that in macro terms we cannot spend less and get more defense. We can throttle back in a smart or foolish fashion, but we cannot have more security in the process.

Similarly, it is vital to appreciate that we can no longer be strong everywhere all at the same time.

Lastly, sizable force reductions could very well generate some compression of our overseas posture; that is, forward deployed units. And, in turn, less support for our foreign and economic policies, less influence with our allies, less ability to deal with crises, et cetera. Even the amended budget, which resumes modest growth in fiscal year 1991, will pose some very difficult choices and probably force structure cuts. However, to ignore that budget and adopt a long-term no-growth pattern or to fall below the President's amended budget would be a grave mistake, even more so given the uncertain security environment.

In my view, it is extremely premature to say that Gorbachev will survive; to say that perestroika will succeed; to say that a START agreement will definitely be concluded; that an effective conventional arms pact is doable—we do not know that; that third-country terrorism will recede; and that the drug problem is in hand. Yet there are those who would jump to those conclusions in the rush to reduce defense spending.

There are a number of encouraging signs on the horizon. It is my belief that our strength has been instrumental in producing those developments and will play a further role in influencing whether those developments actually come to pass. But to discard our policy of peace through strength, just as it is beginning to bear international fruit, makes no sense to me.

Yes; perhaps the brave new world coming will offer genuine opportunities for reducing the military, but we should move to that point as tangible evidence of change manifests itself and as our confidence grows that there actually will be change. We should not do it prematurely.

My plea is that as we face a more confining fiscal climate, Mr. Chairman, that every effort be made to look at the overall picture: threat, international situation, our alliances, the state of our forces, arms control goals—all of these—rather than viewing defense only through an account's green eyeshade.

That completes my summary, Mr. Chairman.

Chairman SASSER. Thank you very much, Admiral.

[The prepared statement of Admiral Crowe follows:]

STATEMENT OF
ADMIRAL WILLIAM J. CROWE, JR., USN
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
BEFORE THE
SENATE BUDGET COMMITTEE
ON
U.S. MILITARY POSTURE
14 MARCH 1989

INTRODUCTION

Mr. Chairman and members of the Committee: I appreciate this opportunity to testify on America's military posture in connection with your hearings on the first defense budget of President Bush.

As you know, the President has modified defense fiscal guidance previously issued by President Reagan and initiated an interagency review of our national defense strategy. In turn, the Department of Defense is reworking programs to square with the new fiscal guidance. Until this work is finished and approved by the President, I will not be prepared to address in detail the Defense Budget for FY1990-1991.

I will proceed to discuss continuities, changes, and uncertainties in the global security environment, all of which will have a considerable impact on the strategic review. Additionally, I will go over the strategic and structural factors which led the Joint Chiefs of Staff to strongly recommend that spending for defense resume modest real growth by Fiscal Year 1991.

MILITARY STRATEGY AND POSTURE

To begin, our national military strategy is designed to safeguard and promote enduring national interests:

- The survival of the United States as a free and independent nation;
- A healthy and growing economy to provide opportunity for individual prosperity and a resource base for our national endeavors; and
- A vigorous alliance relationship to bolster forward defense of the United States and collectively maintain peace with freedom in the world at large.

These interests also describe our success as a nation: a representative government freely elected by the American people; a land bountiful in human and natural resources, a strong and diverse industrial base; a vast market for consumer goods; and the world's largest gross national product. No other country in the world has a better economic and competitive environment for pursuing individual and national endeavors.

BASIC OBJECTIVES

In early 1988, President Reagan submitted to Congress a report on national security strategy and, within this report, you will find two fundamental objectives:

- Maintain security of our nation and our allies by deterring aggression, repelling or defeating any attack should deterrence fail, and ending the conflict on terms favorable to the United States, its interests, and its allies; and

- Respond to the challenges of a global economy by heeding economic factors that affect our national security, tending to foreign sources of supply in critical areas, and limiting the vulnerability of our supply lines.

These objectives remind us that America cannot choose between military security and economic security. To underscore this point, our economy is irreversibly intertwined with a global network of communications, finance, petroleum, metallurgy, and merchant shipping--not to mention imports of industrial materials and machinery. To maintain a healthy and growing economy, we must use our military establishment to nurture a secure and supportive international environment.

Today, the United States is engaged in a complex array of international relationships and negotiations designed to promote a more stable world community and enduring peace, to reduce the level and lethality of world armaments, and to resolve festering regional conflicts. In some areas, we are making progress, but sound and durable agreements inevitably will require protracted and occasionally frustrating negotiations. This challenge undoubtedly will tax our initiative, resolve, and wits. I would argue as well that to maximize the prospects of success the President should be able to deal from strength.

MILITARY POSTURE

Meanwhile, our global military posture is designed to keep the peace, prevent small crises from becoming big ones, and deter major hostilities. In practice, we strive to maintain a healthy strategic and theater nuclear capability, field forces of high quality to offset numerically superior adversaries, exploit total force planning with our allies, and limit war reserve material to the time required by industrial mobilization. To effectively manage risks, this posture must be supported by a durable consensus on expenditures for defense.

Customarily, we do not keep all of our forces ready for combat on an everyday basis. Depending on the situation at hand, we plan to activate our Reserves and, if confronted with a major crisis, draw upon the full resources of our nation. Even with full mobilization, we are not positioned to defend Western Europe, Southwest Asia, and the Pacific Far East simultaneously against a major assault by the Soviet Union and its allies. Instead, we plan to deal with the various theaters sequentially depending upon circumstances and priorities at the time. These limitations obviously call for close collaboration with our European and Asian allies.

SOVIET MILITARY POWER

Cutting across the strategic landscape is a more complex and challenging array of continuities, changes, and uncertainties associated with the evolution of Soviet military power.

LEGACIES OF THE PAST

Legacies of the past include a Soviet military posture designed to defeat every possible coalition apt to oppose the Communist State--plus strong military attachment to the principle that a good defense of the homeland will always require a strong offense terminating in a crushing defeat of the enemy. With this kind of thinking, it is not at all surprising that the Soviet Union has built the largest military establishment in the world.

Enduring elements of Soviet military power are well-known: robust capabilities in space, strategic and theater nuclear forces with intercontinental range, conventional ground and air forces capable of power projection across the entire Eurasian Continent, naval forces poised for the denial of Western sea lanes, and heavily armed surrogates near many of the world's oil fields and maritime choke points. Any U.S. military strategy must confront these realities.

The Soviet Union also towers above all other nations in the production of military equipment. Quantity is not the only worrisome part of this picture. For the last two decades, the USSR has been steadily closing the gap (relative to the West) in military technologies. For example, the Soviet Union is on a qualitative par with the U.S. in such deployed systems as surface-to-air missiles, anti-tank guided missiles, tactical ballistic missiles, short-range naval cruise missiles, communications, and electronic countermeasures. They hold an edge in anti-satellite systems, artillery, chemical weapons and mines.

UNDERLYING PILLARS

On the other hand, the underlying political, social, and economic pillars of Soviet military power are not in good shape. Part of the problem lies in 20 million members of the Communist Party trying to govern the everyday lives of 280 million people and not doing a very good job of it. Lack of political cohesion also can be seen among ethnic minorities occupying territory and clinging to cultures predating the Communist revolution by 1000 or more years. Many of the nationalities are not emotionally attached to or inspired by the "Socialist Fatherland."

Today, Soviet leadership is beginning to understand that the nation's future depends largely on the productivity, initiative, and satisfaction of 130 million workers--not just party functionaries. In turn, State planners must improve the quality of consumer goods and services available to the

Soviet people as a whole.

Compounding these problems is the Kremlin's central budget deficit, concealed from public view for many years. Investment increases are required in the energy sector to sustain economic growth, in food production to keep pace with population, in the machine tool industries to exploit new manufacturing processes, and in a wide range of government services including pensions, housing, and medical care. On top of these demands, the Kremlin is confronted with previously unprogrammed costs associated with disaster relief for the people of Chernobyl and Armenia. Yet, State revenues have sagged in the face of falling world oil prices (a major export).

Given these resource problems (more of which seem to surface every day), I was not surprised by unilateral force reductions announced by General Secretary Gorbachev last December. I was impressed by the size of these reductions (500,000 troops) and the time frame (two years) within which he intends to accomplish them. I suspect he must now let the internal wounds heal before going further, but I do anticipate more initiatives.

Meanwhile, the Soviet military faces challenges of a related but different order. Today, Minister of Defense Yazov and an increasing number of other leaders seem genuinely concerned about sagging patriotic support for the "Socialist Fatherland," recruits not prepared for the moral and physical rigors of compulsory military service, officers lacking "fatherly concern" for the troops, poor operational and technical discipline within the ranks, too much damage to combat equipment in the field, and lack of candor in readiness reporting.

Overall, the Soviet military establishment is having a tough time insulating itself from political, social, and economic problems cutting across the nation as a whole. By admitting that these problems exist, however, the Kremlin has taken the first step down a long and, I suspect, difficult road of shifting from quantity to quality in the structure of the Soviet armed forces. How this will affect their net military capabilities remains to be seen.

NET ASSESSMENT

Moving on to my annual net assessment, some preliminary words are in order about force reductions announced by the Soviet Union and its Warsaw Pact allies.

At the moment, the USSR and its allies are focusing on ground forces. If carried out, these reductions will affect the balance of land power in Europe and Asia. Opposite NATO's Central Front, Warsaw Pact reductions also represent a good down payment on Gorbachev's pledge to move toward a less offensive posture. We must, of course, verify and satisfy ourselves that these reductions actually occur in the time frame and on the scale promised by the Kremlin.

It's also important to note that much of the global military picture remains untouched by these Soviet reductions--for example, activities in space, strategic nuclear forces, strategic mobility, and support for states who sponsor terrorist acts. It is not clear yet whether maritime units will be included. Further, military balances in the Third World will be affected more by Soviet arms transfers than by reductions they plan in the Far East, Southwest Asia, or the regions opposite NATO.

Overall, I am less inclined than usual to predict the future military balance. However, the latest net assessment does provide a relative complete picture of where we and our allies stand today in comparison with the Soviet Union and its allies. While covering this ground, I will mention demands placed upon our combatant forces as well as their preparedness to deal with these demands.

MARITIME DEFENSE

As a member of the North Atlantic Alliance, the United States is pledged to defend the Atlantic and Mediterranean as a whole. This commitment is most challenging in the Norwegian Sea and the Eastern Mediterranean where the Soviets contemplate a campaign of sea denial. We are confronted with similar problems in the Pacific where Soviet naval power overlaps lines of communication to the Republic of Korea and Japan.

Today, we would fare well in this contest: a product of our nuclear attack submarines, carrier battle groups, maritime patrol aircraft, surface action groups, and replenishment units--plus support provided by our allies in the form of choke point control, mine clearance, land-based tactical aircraft, and especially naval escorts. All of this presumes high readiness and sufficient warning time to reach assigned operating positions before the outbreak of hostilities.

What happens in the Atlantic and Pacific remains very sensitive to our ASW posture. While making substantial investments in nuclear propulsion, quieting, and stand-off weaponry, the Soviets have not cut back sharply on their force of attack submarines--still over 300 in number. To confine this threat to home waters and to establish the needed control over vital sea lines of communication (SLOCs) will require an all-out effort by the bulk of our Atlantic and Pacific Fleets. Throughout, we must achieve high exchange ratios in the design and operation of our nuclear attack submarines. We also are counting heavily on our maritime patrol aircraft, active and reserve, to monitor approaches to the mid-ocean SLOCs and to the United States itself.

On balance, the mobility and capability of our naval forces represent one of our greatest advantages vis-a-vis the Soviet Union and its surrogates. They will be useful in containing the Kremlin to a land campaign and in confronting the Soviets with a wide and unpredictable number of threat axes. Similarly, they buttress our ability to communicate with our allies and to project our own air and ground power in either major or limited hostilities or peacetime crises (e.g., the Persian Gulf). This is a flexibility the Soviets do not enjoy to the same degree.

STRATEGIC MOBILITY

The United States maintains strategic mobility forces to underwrite overseas treaty commitments and, at times, to keep small crises from getting out of hand in the Third World. For rapid deployment of troops, we depend largely on airlift. For tactical mobility on the ground (helicopters and vehicles), we rely on a mix of pre-positioned equipment, wide-bodied air transports, and sealift. Most of the follow-on ammunition and fuel will go by sea. Overall, we are well postured for contingencies short of a major war.

Soviet reliance upon strategic mobility forces is driven, in part, by the vast size of the country, marginal road and rail lines linking Russia to the Far East, and reliance upon regular military forces to deal with internal security problems. Both sealift and airlift support a steady stream of Soviet arms transfers to clients in the Third World. As seen in the Afghanistan campaign, Soviet air transports also can be used to project significant military power to adjacent countries.

Given a crisis involving NATO and the Warsaw Pact, the Soviet Union would have an initial advantage in reaching Western Europe due to short distances and a developed road and rail system. The Kremlin also has an advantage in merchant shipping which can be commandeered easily for military purposes. In contrast, we would have a tough time mustering the ships necessary to reinforce Western Europe in accordance with our goals--a consequence of insufficient capacity as well as ownership, flags, and ship crews shifting away from NATO to semi-industrial and non-aligned nations of the world.

Once hostilities commenced, the Soviet merchant fleet would find itself confined to home waters, bottled up in neutral ports, or otherwise out of action. In contrast, their strategic airlift provides a robust wartime capability to swing forces between the European and Asian theaters--all within Soviet airspace. This capability will improve substantially with the new AN-225 air transport which can lift some 500,000 pounds of cargo or twice that of our C-5B.

One other aspect of our mobility deserves comment. If fiscal realities were to require force reductions both at home and overseas, our mobility assets would become even more crucial. We would expect any scaled down forces to be able to deploy quickly and effectively through the globe, but this could only be achieved with adequate modernized lift.

SPACE

Over time, the United States and the Soviet Union have acquired a hefty reliance upon the space environment for communications, and intelligence in peace, crisis, and war.

By most measures--infrastructure, launch boosters and payload, numbers of space vehicles and sensors, and activities and time in space--the Soviet Union has a pronounced lead over the United States. In technical sophistication, miniaturization, and satellite reliability (or the time before normal decay in orbit), the United States still enjoys a comfortable lead. Thus, we do not have to launch as many satellites to keep the same number in orbit during peacetime.

In crisis or conflict, our chief concern is with Soviet antisatellite systems, which place some of our communications and intelligence at risk. This is a main element of the military balance where we find ourselves lacking a deterrent. Yet, the credibility of our strategic deterrent and the effectiveness of our general purpose forces increasingly depend upon a secure position in space.

Overall, America does not need to match the Soviet Union by increasing its space launches four-fold or its time in space three-fold. The U.S., however, does require significantly improved space launch capabilities. Moreover, we cannot tolerate a marked Soviet advantage in capabilities to destroy or disable satellites. Thus, I fully support a larger and less constrained investment in antisatellite systems by the U.S. Government.

STRATEGIC NUCLEAR FORCES

With respect to the strategic nuclear balance, neither the U.S. nor the Soviet Union have neglected investments in strategic warning systems, and both have a reliable and credible capability to detect preparations for an all-out nuclear strike, although our warning system is more sophisticated.

Each side does approach strategic nuclear parity in a different way. For its part, ~~the~~ Soviet Union has more balance in strategic offensive and defensive systems. Their TRIAD of land-based missiles, ballistic missile submarines, and bombers is complemented by substantial investments in leadership survival, strategic air defense, antisatellite devices, and the world's only ABM system. In the Krasnoyarsk radar, they have gone beyond limits of the ABM Treaty.

Additionally, Soviet strategic offensive forces are more dispersed and hardened than those of the United States. In the case of ICBMs, they have exploited government control of vast lands within the Soviet Union and placed most of their missiles in very hardened silos or on mobile launchers. When it comes to military targets, our computer-supported analyses always show that Soviet ICBMs give the Kremlin a relative advantage in "damage expectancy." This lead means little, however, in the overall nuclear calculus.

For its part, the United States must maintain general nuclear parity with the Soviet Union by means of strategic modernization programs set in motion over the last decade: more firepower in the TRIDENT class submarine, improved accuracy and hard target kill capability in the submarine-launched D-5 missile and the land-based PEACEKEEPER missile, and the long range and high accuracy of air-launched cruise missiles.

These strategic modernization programs are "vital" as the Soviets continue to improve their active and passive defenses and, especially, as we move into a START regime. Beyond these weapon systems, our most pressing current problem is to resolve the mobile missile issue. Put bluntly, a healthy strategic deterrent is the cornerstone of our overall defense posture and compensates to a real extent for some of the shortcomings in our theater nuclear and conventional forces. It serves a similar function for many of our allies.

Further, research on the Strategic Defense Initiative serves warning that the United States will not allow the Soviet Union to monopolize the field of anti-ballistic missile systems and shows considerable promise for an ultimately non-nuclear defense posture.

THEATER NUCLEAR FORCES

Starting in the mid-1960's, NATO became increasingly dependent upon theater nuclear forces to compensate for conventional shortcomings and provide options short of a strategic nuclear exchange. The USSR responded in kind and eventually outnumbered the U.S. in intermediate and shorter-range missiles. The INF Treaty will eliminate these types.

Major asymmetries continue in short-range nuclear missiles, favoring the USSR. Additionally, NATO's practice of relying upon dual-capable tactical aircraft raises worrisome questions about the survivability and attrition of these assets at the outset of a conventional war. In part, we can hedge this risk by relying more on rear area bases or seaborne platforms (TLAM), but SACEUR genuinely needs a modern nuclear battlefield system as seen in a follow-on to Lance.

I also believe very stongly that NATO and the Pact have a shared responsibility to raise the nuclear threshold in Europe.

CONVENTIONAL FORCES

Today, America's conventional strength around the world is relatively adequate to deal with a wide spectrum of peacetime crises and limited contingencies. The most stressful and worrisome challenge, however, would be a full fledged conflict with the Soviet Union and, in turn, the task of defending NATO Europe alongside our allies.

NATO/Warsaw Pact

As a founder and member of NATO, America is committed to the forward defense of Western Europe and, if necessary, the restoration of allied territory. Only forces of the Warsaw Pact, led by the Soviet Union, threaten the territorial integrity of NATO Europe.

Over the years, no region in the world has been subjected to more military assessments than the Central Front of Europe. Results are fairly consistent--the deterrent stance of NATO forces has worked for forty years. Deterrence is, of course, a complicated and uncertain calculus with a high political and psychological content. In Europe, I believe it is fundamentally a product of allied political cohesion (who wants to declare war on 16 nations), America's global strength, the Free World's predominant economic position, internal problems in the Soviet Union, and the cutting edge of NATO forces positioned on the Central Front.

If deterrence fails and the initial defense falters, allied forces will face an unsatisfactory outcome: possible loss of considerable territory or, in the alternative, the prospect of resorting to theater nuclear weapons. In turn, we want to make conventional defenses as strong as possible to lessen the need to use nuclear weapons.

Countless studies and programs have addressed measures to enhance the conventional defense of NATO and reduce the prospects of a nuclear spasm. But today NATO is still not able to mount a genuinely effective conventional defense against a determined Soviet campaign. In the final analysis, only adequate conventional forces can offer an assurance against both aggression and the prospect of nuclear war, i.e., large numbers of well-trained forces, weapon systems capable of yielding high exchange ratios, tactical expertise in combining arms, adequate inventories of modern munitions, and sufficient combat logistics support.

At the moment, NATO defense planners are looking at high leverage technologies and a host of other measures to more effectively blunt the initial attack. Obviously, this is the first order of business for an Alliance long preoccupied with deterrence. When it comes to defense, however, NATO's Central Region does not have the number of troops and weapons nor the inventories of preferred and common munitions necessary to prevail in a high intensity conflict of several months or more with the Warsaw Pact.

Of great concern is the possibility that NATO may not make the investments necessary to correct this situation. Perhaps, unilateral Soviet reductions or conventional arms negotiations will redress the balance, but it is much too early to rely on such judgments. In fact, experience would argue that the best way to bring the Kremlin's leaders to the table is to enhance your own strength. The most frustrating aspect of this picture is that the U.S. cannot solve this problem alone. Without allied cooperation and willingness to spend more, a successful conventional defense of Western Europe will be extremely difficult to mount.

Put simply, the most glaring weakness in our global posture is our inability to adequately defend Western Europe conventionally. This shortcoming does not necessarily mean that Europe is in immediate jeopardy or that our deterrent policy will be ineffective. As mentioned earlier, deterrence has a number of elements besides sheer military strength. It does mean that we should look closely at our overall policies and insure that we are realizing the highest return on our investment in terms of deterrence. This is especially important today as we confront the prospect of little or no growth in defense appropriations.

Having stressed NATO in order to note our most pressing military challenge, the following comments address other regions of special U.S. interest.

East Asia and Pacific

In the Pacific, forward-defense of the United States (Alaska, Hawaii, and the Marianas) is bolstered by our alliance with Japan. In turn, we are committed by treaty to the territorial integrity of Japan and by another agreement to peace and stability on the Korean Peninsula. To maintain a favorable balance of power in the region, we must protect lines of communication to China as well as Northeast and Southeast Asia.

Today, I judge the posture of U.S. and allied forces in the Pacific sufficient to deter the Soviets from a major attack in that theater and, if deterrence fails, prevent them from achieving their military objectives. The Republic of Korea is similarly equipped to deal effectively with any threat from the North that does not involve either the Soviet Union or the Peoples Republic of China.

Two words of caution are in order. First, the Soviet Union has been increasing the reach and firepower of its air and naval forces in the Pacific and supporting a general upgrade of tactical air forces by North Korea and Vietnam. Second, we are confronted with political pressures on bases in the Philippines. In short, we must sustain our air and naval strength in the Western Pacific and, at the same time, remain flexible on base options. This is not an easy situation to manage.

Southwest Asia

In Southwest Asia, U.S. security interests are tied closely to energy objectives--namely, access to oil at reasonable prices. The Persian Gulf has more reserves than any other region in the world, and no producer can lift petroleum out of the ground at less cost than Saudi Arabia and Kuwait.

Should the Soviet Union ever decide to co-opt the Gulf oil fields, their divisions and tactical air forces could overwhelm the regular troops of Iran, but they always have to worry about what happens next. Our gaming suggests, for example, that the Central Command (CENTCOM) can contest a Soviet military foothold in Iran and probably maintain some access to the Persian Gulf. When stiff resistance by the Iranians, multilateral responses by the West, and support by the Gulf Cooperation Council are added to the picture, the Soviets would be confronted with even more serious problems than they encountered in Afghanistan.

Again, the Kremlin cannot overlook the fundamental global strength of the United States. Even if successful in Iran or the Gulf, their progress would be limited to the water's edge and America's ability to project power would severely hamper Soviet use of captured oil facilities.

Latin and Central America

Turning to Central America, the situation is in a state of change. The five Central American countries recently have concluded an accord designed to bring democracy to Nicaragua and disband the Nicaraguan Resistance or "Contras." We are assessing the impact on the region and on our overall objectives. Up to now, Nicaragua has worked against peace with freedom in the region, virtually ignoring terms of the Arias Peace Plan. The burden of proof is still with the Sandanistas. Above all, they must respect human rights within their own country and stop interfering with their democratic neighbors.

Meanwhile, the United States is faced with a crisis in Panama and sagging confidence in leadership of the Panamanian Defense Force. A resolution will be painful and probably protracted as Panama sorts out its political and economic problems.

Concurrently, we are confronted with the illicit trafficking and production of narcotics in Latin America, posing a threat not only to the integrity and stability of governments to our South, but also to the social fabric of the United States itself.

Against this background, I much prefer to see a bipartisan agenda for the region and an enhanced security assistance program keyed to the everyday threat of low intensity conflict within the region. Over the next several years, however, America will have to rely primarily on its own forces to protect U.S. lives and property, improve air and sea surveillance of the Caribbean, fend off coercive moves by Cuba and Nicaragua, bolster U.S. commitments under the Rio Treaty, promote regional stability generally, and support the drug interdiction program. We are competent to do this, but it will take persistence, time, and some reordering of our priorities.

INTERNATIONAL TERRORISM

Cutting across the international scene is a persistent threat of state-supported terrorism as seen in assassinations, kidnappings, hijackings, and bombings. While the Kremlin professes to have no interest in this form of coercion, some of its allies and surrogates remain deeply involved in the training, covert passage, and arming of terrorist groups.

In response to this threat, an ounce of prevention by civil authorities is worth much more than a pound of military cure. But it's very tough to provide a point defense of every public meeting place or conveyance. Thus, when and where it is possible to do so, we depend heavily upon our Special Operations Forces. In this regard, I can vouch for their professional expertise, but I cannot promise success in every instance. In fact, some acts of terrorism are so disastrous and conclusive that there is not much anyone can do to help after the fact.

Given these realities, I believe we must make terrorism more costly for the nations who support it. Our Special Operations Forces have a role in this process. In practice, we also depend upon our conventional military forces to send a strong message to states known to have a role in specific acts of terrorism, Libya being a noteworthy example. Sometimes the international community has accused us of being heavy-handed, but this must be weighed against no deterrent whatsoever to this form of aggression--normally conducted against innocent civilians.

PREPARING FOR THE FUTURE

At this point, many members of this Committee may be wondering how the U.S. Government cut $300 billion from the five-year defense plan contemplated in Fiscal Year 1985 and still managed to end the decade with a position of considerable military strength. Three factors account for this transition:

- First, President Reagan placed a high priority on the strategic modernization program, alliance commitments, and the everyday excellence of our combatant forces.

- Second, the Military Services postponed conventional force goals planned in the early 1980s, slowed down modernization programs, and cut back on the buildup of war reserve material.

- Third, our combatant forces continued to receive new fighting vehicles, combat aircraft, and naval warships funded during the FY1979-1985 defense buildup.

In essence, you may like many aspects of the foregoing assessment of current capabilities, but you must understand that this assessment is largely the product of defense investments made during the early 1980s. What happens in the 1990's is a function of spending for defense today. Consider, for example, the implications of two percent versus zero or less real growth in spending for defense over the next five years.

TWO PERCENT REAL GROWTH

With two percent real growth, as proposed by President Reagan, we could continue on course with our strategic modernization program, maintain a balanced conventional force, nourish research and development programs, and protect a combatant force of high quality.

We would not be able to replace major items of combat equipment on a one-for-one basis. This means, in effect, that the United States will be moving toward a smaller conventional force throughout the next decade. Granted, newer generations of combatant equipment may be more effective than the last, but we would not have the numbers of today.

Substantial trade-offs will be required in the aviation sector. The Army would have to reduce its helicopter fleet from 8500 to 6500 platforms; the Air Force would go from 37 to 35 tactical fighter wings; the Marine Corps would be cutting back on Av-8B and MV-22 (Osprey) procurement; and the Navy would rely on Reserves to man 2 of its 15 carrier airwings.

With respect to naval combatants, we would have to defer achievement of an amphibious lift capability for one Marine Expeditionary Force plus a Brigade until the late 1990s. The Fleets would remain short of AAW destroyers throughout the next decade, and we would go below 100 nuclear attack submarines while moving ahead would the new SSN-21.

Further, we will be right at the margin when it comes to protecting a force of high quality: military compensation barely keeping pace with inflation (not comparability with the private sector), more deferral of depot maintenance, a growing shortfall of base facility maintenance, and depletion of war reserve material in the interest of peacetime training and exercises. Obviously, these practices could not continue as an open-ended proposition.

These and other implications of two percent real growth can be found in the last annual report of Secretary Carlucci.

NO REAL GROWTH OR LESS

No real growth or less would pose even more serious and risky choices between competing priorities within the defense budget.

For example, if we place a high priority on strategic modernization, advancing military technologies, and the everyday quality of our combat forces, we will have in turn to cut back sharply on conventional force structure or current modernization programs. In either case, overall conventional military strength would go downhill.

All of this would occur at a time when we are trying to become less, not more, reliant upon nuclear weapons to deter on the Central Front of

Europe and other forward areas. Further, we would not be able to stand fast while negotiating a reduction of conventional forces in Europe--unless, of course, we are prepared to accept a marked and adverse shift in the Pacific balance of power.

Alternatively, we could try to nourish a supportive global security environment, hold the line on current commitments, and protect conventional force structure. In this case, we would have to postpone strategic modernization programs, cut back on research and development, and allow further depletion of our war reserve material.

Slashes of this type would translate into an aging TRIAD of strategic offensive forces and lower investments in the SDI--not a good combination in terms of deterrence or our leverage in START. Moreover, we would not be investing as much as we should be in conventional military technologies and our defense industrial base. Yet, we know that America's prowess in high technologies is the best hedge we have against uncertainties surrounding the evolution of Soviet military power.

Simply put, we cannot get more defense for less money. In fact, we are at a point where even small cuts in defense outlays will translate into disproportionate reductions in current or future military capabilities.

AMENDED DEFENSE BUDGET FOR FY1990-1991

Against this background, President Bush has issued new fiscal guidance to the Department of Defense calling for no real growth in FY1990 followed by 1 percent real growth in FY1991-1992 and 2 percent in FY1993. About $16.2 billion will have to be cut from the FY1990-1991 budget submitted by President Reagan and over $60 billion from the five-year plan as a whole.

As you are aware, President Bush places a high priority on strategic modernization. Similarly, he agrees with the Joint Chiefs of Staff and the Combatant Commanders that we must nourish the everyday excellence of our military establishment. Thus, managing the initial decrement of $16.2 billion will require deeper trade-offs between conventional force structure and modernization.

Pending the strategic review ordered by President Bush, some argue that we should protect conventional force structure and take the cuts in procurement accounts. The resultant impact, however, will be less upfront funding and fewer benefits from multi-year procurement. More importantly, we will be confronted with further slippage in critical aircraft and missile modernization programs as well as additional backlogs in depot maintenance, etc.

If we concentrate the cuts on force structure, the question is where and how to do it. Some believe that we should stand fast in the forward areas and focus on our CONUS-based forces. Others argue the opposite case. In any event, saving money requires us to eliminate altogether some active units.

These simple examples illustrate the complexity and difficulty of the choices. Complicating the picture are the uncertainties in the international picture. Are we confident that Gorbachev will succeed, that he will survive, that START is a done deal, that regional instabilities will not persist, that the drug problem is in hand, that 3rd country terrorism is on the wane? I submit that it is premature to reach any of these findings. On the other hand, just as our "peace through strength" policy is beginning to bear fruit, there are those who would jump to these conclusions in order to save money.

A much more thoughtful way to do business would approach the problem carefully and scale down as our confidence increases. Most importantly, if we are forced to take substantial force cuts, the Congress would be well advised to dovetail these with progress in the arms reductions talks. It is with these kind of thoughts in mind that President Bush has ordered a broad based strategic review to examine our approach to the whole panoply of problems. This review is being conducted to make recommendations not only to the Executive branch but also to the Legislative arm.

It is clear at this point that with decreasing funds we cannot be strong everywhere, and we cannot continue to do what we do today effectively. This reality portends change perhaps in force structure or modernization or both. Certainly, to drop below the recommended budget for several years will require significant rollbacks and would mark a decreased departure from present security policy. Such a decision should not be taken lightly. Consequently, to get the most for our investment both in economic and strategic terms, we will be well advised to move gradually and to coordinate these moves with the international climate, i.e., Soviet moves, arms control progress, and allied relationships. To ignore these factors and to slash defense appropriations precipitately would be ill-advised at best and disastrous at worst.

CONCLUSIONS

In sum:

America will enter the 1990s spending little more than five percent of its gross national product on defense. This is a very modest investment considering the size of this product, the worldwide spread of commitments, the global foundations of our economy, the importance of a stable and secure international environment, diverse and recurring threats to the national interests, lingering concern about the evolution of Soviet military power, and a strong American interest in promoting freedom and democracy in the world at large. Every day, our nation benefits from a military establishment respected by friends and adversaries alike.

Over the last four years, the United States has worked out a relatively reasonable balance between our various global responsibilities. In the process, however, our forces are tightly stretched and the level of our capabilities involves more risk than the Joint Chiefs of Staff would prefer. Specifically:

- All of our active and Reserve forces will not be ready on an everyday basis to defend NATO, Southwest Asia, or the Pacific Far East against a major threat from the Soviet Union;

- In the unlikely event that deterrence fails and we engage the Soviet Union worldwide, we will have to sequentially reinforce and defend the various theaters; and

- On NATO's Central Front, we may be forced to trade space for time or to consider resorting to the use of nuclear weapons. Neither option is very palatable.

Concurrently, the U.S. is challenged to maintain a credible nuclear deterrent, a secure position in space, a supportive maritime environment, and strategically mobile ground and air forces.

While the time seems right to develop a more stable and sustainable relationship with the USSR, the U.S. and its allies must remain wary of Soviet military power. Even after unilateral force reductions announced by Gorbachev, the USSR will have an active military establishment in the neighborhood of 4.6 million personnel. Granted, the Soviets seem anxious to follow the INF Treaty with a START agreement and conventional force reductions from the Atlantic to the Urals, but little has concluded that we can conclude about. Further, it remains to be seen whether the Soviet process of substituting quality for quantity in armed forces structure will translate into reduced military capabilities. This is a critical transition we will have to watch and measure throughout the 1990's.

Today, the Department of Defense is challenged to provide more forward looking, fully integrated, and fiscally constrained advice to the President and the Congress. Yet, civilian and military leaders in the Pentagon will never be able to deliver the goods without a durable consensus on spending for defense.

At this point, we cannot get more defense with less money. With the fiscal guidance of President Bush, we can move into the next decade with much of the military strength we have today. Granted, we may have to ease toward a smaller conventional force, but this will occur in a gradual fashion--not as a precipitous decline apt to undermine our alliance relationships, reduce our leverage in international negotiations, and cause massive turbulence in our military establishment.

At any level of spending for defense, we must protect a force of high quality--the backbone of our military strategy, our strongest card in crisis management, and the best hedge against uncertainties surrounding the evolution of Soviet military power. Quality requires more than the exploitation of advancing technologies; we must as well nourish the everyday excellence of our combatant forces and people.

In essence, Mr. Chairman, I have tried to arm you with my best estimate of what various spending levels will do to our military posture. You may decide that you want to spend less than President Bush has proposed, but I would urge you first to consider the entire picture.

Chairman **Sasser**. I have a few quick questions, and then I'll yield to the other members.

Admiral Crowe, let me just ask you this question: Do you see any objective evidence of the execution on the part of the Soviets of the Gorbachev plan to pull back and scale back Soviet military forces as of today?

Admiral **Crowe**. Mr. Chairman, we certainly see some changes in patterns of what the Soviets are doing. First of all, it is not clear that those recent changes are a result of Mr. Gorbachev's announcements. And it is also not totally clear as to the significance.

For example, the Soviet Navy has cut down on its deployments overseas. In other words, they have retreated to their bastions and to their ports. We believe that this was probably inspired by a combination of reasons. They have not reduced any of their force strength. What they are doing, when they are home, is more training than they did when they were deployed.

It is my own view that they discovered that certainly their patterns of deployment, unlike ours, do not involve heavy operating tempos and really basic training. And so I think they have partially gone home in order to increase their training.

We have seen some changes in the character of their ground force exercises. Marshall Akhromeyev spoke to me about this, and he described it as a change to a more defensive philosophy. Now, they have not changed the number of tanks or any tank weapons or personnel carriers or aircraft, et cetera. They have changed how they use those in exercises the first few days of the exercise. Marshall Akhromeyev described this as a more defensive structure.

He then said that, of course, we plan that if the politicians and diplomats cannot work out some accommodation in the first 30 days of combat, we plan to go to the offensive. And we still have the capability to do that—take the offensive just like they do now. So I do not know how significant that change is, but it is a break in the pattern.

On the more important things, like force reductions, we have yet to see real tangible evidence of that. Certainly these recent announcements on production cuts, which I consider the most significant harbinger, are important but we have nothing yet to support these cuts in a concrete way.

Chairman **Sasser**. Let me ask you this, Admiral: Would it be premature at this juncture to expect solid evidence of force reduction? Or should we be expecting that at this time from the Soviets if they intend to carry out Mr. Gorbachev's intentions?

Admiral **Crowe**. I think your question is a very fine one. It was curious to me that one of the differences between Akhromeyev's information to me and Mr. Gorbachev's announcement is that the marshall said that he anticipated the kinds of reductions they were thinking about would take 3 to 5 years; Mr. Gorbachev estimated 2 years. This has been repeated in a number of places, that they could do it in 2 years. And it is true that these kinds of things, managing the reduction, managing the force going back into the economy and so forth, do take time. Perhaps it is a little premature, but we are monitoring it closely. We are extremely interested in the reduction, and we hope it takes place.

Chairman SASSER. Well, I quite agree that we should not act prematurely and act on the basis of hope and act just on the basis of statements and rhetoric emerging from the leadership of the Soviet Union. But it is encouraging.

Admiral CROWE. Absolutely.

Chairman SASSER. And it is encouraging, at least in my mind, that perhaps we see some lessening in the tempo of Soviet military operations in some theaters.

I posed this question to you, Admiral, a little earlier, and I would like to get your response for the record, if we could. Some defense experts, like—oh, to name a name—Mr. Edward Luttwak, have suggested that we accept lower levels of readiness as opposed to cutting modernization or force structure. And his thesis is that we can increase readiness more rapidly than we could increase modernization or accelerate modernization, or increase force structure if we got into an emergency situation.

If you had to make the tough choice between reducing force structure or curtailing modernization or curtailing readiness, what would you choose, and what would you say about the theory that we ought to curtail readiness as opposed to the other two alternatives?

Admiral CROWE. I am familiar with the article that you are referring to, Mr. Chairman. I should say as an aside, I do get an awful lot of advice on these subjects from many quarters.

Chairman SASSER. You know how we feel when we read those editorials every day in our newspapers coming up from our States. We get a lot of advice on how to vote, too, Admiral.

Admiral CROWE. I think Secretary Taft will also have some comments on this.

To begin with, depending on what kind of bottom line we are faced with, when we are talking about meeting really tough appropriation limits, I think everything should be open at least to consideration. And the suggestion that we look at reducing our readiness as opposing to reducing our forces, I consider a serious proposition. It is not a superficial one. It should be considered.

On the other hand, from the standpoint of—I believe I speak generally for the career military, we have some serious objections and cons to going the hollow forces route. To begin with, people of my vintage have been through that route, and it is not very pleasant and not very effective, and we do not like it very well.

I think one of the important things that has been overlooked by many commentaries—and especially by Mr. Luttwak—is that when you go down to smaller forces, or when you are faced with fiscal cutbacks, if you choose the route that he recommends, you are playing with the very heart of your organization primarily in terms of personnel.

You are talking today about an all-volunteer force environment. First of all, we have to attract people. Second, we have to keep them. We train those people. We spend a great deal of money on them and so forth. The quality of your people, the quality of your force always degrades when it goes hollow.

I hear a great deal of talk about how much we pay our people to attract them, and let me tell you the thing that repels volunteers, chases people out of the service more than anything else. That is when a soldier cannot go into the field, when an aviator cannot fly, and when a sailor cannot go to sea, he does not like that, and he leaves. He goes away. And that is what happens to the people; that is what happens to the leadership; that is what happens to the quality of your force.

Now, maybe that is not important to someone, but in our circumstances, I do not see how it cannot be important. First of all, you have smaller forces to deal with, and when you use them, you need quality more than ever. Secondly, when you expand, you need a quality force to furnish the cadre for expansion. If you have bad people, you expand badly. If you have good people, you expand well. And that is the way a professional would look at it.

Chairman **Sasser**. Well, I think that is a very excellent answer. My time has expired. I do have some question I want to turn to the Secretary with, but I will yield now to Senator Domenici.

Senator **Domenici**. Mr. Chairman, I come here from having discussed Indian affairs in another committee, so I need a little bit of time to reorient.

Chairman **Sasser**. Shall we yield here to Senator Symms?

Senator **Symms**. Thank you, Mr. Chairman. I want to thank both Mr. Taft and the Admiral for what I consider to be excellent statements.

I have to apologize. The Finance Committee's meeting is going to require that after I ask you a couple of questions, I will have to excuse myself.

I want to say that I could not agree with you more, Admiral, on your statement. If we have not seen in the last 8 years, due to the early 1980s' buildup, that peace through strength works, I do not know what it is going to take for the politicians in this town to realize that we are winning the ideological conflict in the world. Capitalism-and-freedom works. People around the world know that oppression and Communism does not work. And if we just stay strong, we are in the process of seeing a new world unfold with perestroika and glasnost, and what is happening on the Chinese mainland with them reaching for more ideas of freedom.

I really have to agree with you in your statement. It is just so obvious to me, anyway, that America's strategy is working. But I often think of the past, the troubles we got into in World War II, for lack of preparedness; signals prior to Korea that we would not be willing to stand up and fight; and every other time in our history when we were not prepared was always when we were dragged into a war. And it is interesting that on our 200th anniversary our first President said, "if you want peace, prepare for war". I think it is still true today and I think that is what you are saying.

So, I am almost skeptical of your budget. I know you take orders from the White House, but I still wonder if you are asking for enough. When I think of what we have to preserve in the United States, and we are saying that we can only spend 5 percent of our GNP to defend peace and freedom both here at home and abroad, I question whether it is enough and whether you are being aggressive enough in coming to the Congress, and I would urge you to make that case.

Last summer, the Department of Energy recommended a two-reactor strategy—this question deals with the modernization of our nuclear weapons—two reactors, two technologies, two sites to replace the three aging and currently non-operating reactors at Savannah River. Did the Department of Defense participate in the process by which this recommendation was made, and does the Department support this strategy?

Mr. TAFT. Senator, if I can respond to that, the answer is that we did participate in that review through the Nuclear Weapons Council and, in an advisory capacity, to the Secretary of Energy, and he, of course, had the responsibility for making that decision.

My own view, and the view of Secretary Carlucci at the time, was that Secretary Herrington made the correct decision and we strongly support it.

Senator SYMMS. Do you concur with that, Admiral?

Admiral CROWE. Yes, I do.

Senator SYMMS. Would you agree, Admiral and Secretary Taft, that the two-reactor strategy will reduce our risk of losing production capacity, for example, if we had a design flaw in one of the reactors, or if we had a threat of espionage, site intrusion, earthquake, or whatever other risk that might happen?

Mr. TAFT. Senator, that was a major consideration in our strong support of the position that was taken, it is precisely this concern.

Senator SYMMS. In dealing with the Congress in this coming year, I know that it was the Tower strategy to try to make a tradeoff with the Congress. Tower told me he had thought a new approach should be tried, in view of the votes in the Congress and the result that the American people have elected people who campaigned for Congress on platforms of spending less money on defense and more money on other non-defense expenditures. They have elected a President who has the opposite view, but Senator Tower's strategy was that he would try to make an exchange with the Congress. If we would do less micro-management from Congress, directing the interior details, or in other words forcing the Department to buy certain weapons systems when they did not want them, and let you have a freer hand to make those decisions, in exchange he thought we could save money. Is that a strategy, in light of what happened to Tower last week, that we should abandon?

Mr. TAFT. Well, Senator, I would say no, but there is a difficulty with it in the context of the present structure for proposing budgets and considering them that I think it is important to understand.

The Department is obliged to propose a budget which is justified by program. There are no bad management excesses that are identified in that budget which we can agree with you to return to the Treasury if you will fulfill your part of the bargain.

When we go up to the Armed Services Committee and the Appropriations Committee, we are proposing defense programs. When they ask us how are you going to reduce your budget, we do it by reducing defense programs. The better way of getting at those management savings is not to demand the lower budget up-front, but first to give the Department the authority. When savings are realized in the management of the program—as, for example, in 1983 and 1984, they were realized in the shipbuilding program, where we have a lot of support for management reforms—then those amounts can be returned to the Treasury.

But, if you ask us first to reduce the budget, the only way we can do it is by reducing defense programs. At the end of the day, if you appropriate the money for those programs and say now go manage them as efficiently as you can, we will have the money and we can return it to the Treasury, and that in fact happened.

We lapsed about $1 or $2 billion a year. These funds have either reverted to the Treasury or been used to fund other high priority programs, but it is a problem asking us in advance.

Senator **Symms**. Thank you very much. I asked the question because I am no longer on the Armed Services Committee, but I did have a two-year experience serving on that Committee, and I was quite amazed to find out how much goes on in the defense committees in the Congress with add-ons and pork barreling that the Pentagon really is not asking for but, because of the parochial interests of certain Congressmen or Senators, that you are instructed to spend money on.

Mr. **Taft**. Senator, those are usually funded out of real defense programs.

Admiral **Crowe**. Could I just say that any strategy that has the prospect of reducing micro-management has a great deal of appeal for me. [Laughter.]

Senator **Symms**. Thank you very much. My time is expired, Mr. Chairman. Thank you very much. I certainly appreciate the testimony of both of you here this morning, and I hope that we can see that some of the things that you are talking about can become a reality.

Chairman **Sasser**. Thank you, Senator Symms.

Senator Exon.

Senator **Exon**. Thank you very much.

Mr. Secretary and Admiral, welcome to you here this morning. You have done an outstanding job, in my view, and I salute you particularly, Secretary Taft, for carrying on a most difficult task and staying in place to run that Department over there during this period. You are basically marking time, but we appreciate that.

Mr. **Taft**. Thank you, Senator.

Senator **Exon**. I have been a little bit amazed at some of the things that I have heard here this morning which, Mr. Chairman, I suggest highlights as much as anything else the unreal world that we live in, collectively and individually.

When I hear the Secretary say, whom I am very fond of, that we should be able to balance the budget if we hold defense to the levels suggested by the new President, when he says that it seems to me he ignores the fact that we have got a $140 to $180 billion deficit to make up, because of past expenditures, including significant amounts of money that we have added to the defense budget. As the Chairman of the Strategic Forces and Nuclear Subcommittee, I have been part of that and I have been proud of it.

I just listened to the very interesting exchange, where both the Secretary and the Chairman of the Joint Chiefs of Staff said, oh, boy, you bet, we are all for that double-barreled approach to have the redundancy that would be necessary to have for making tritium.

Now, you both know full well that we cannot afford that. If the position to go forward with the program, the one in Idaho and one in South Carolina simultaneously came out of the Department of Defense, with all of the other priority matters that you have, shame on you, because I do not think that idea indeed came out of the Secretary of Defense's office or the military in general.

I want to simply say that you are ignoring, I think, the $260 billion that is presently estimated it is going to cost to clean up in the next 10 to 15 years the mess that we have environmentally in our own defense establishment, plus building the new reactor for tritium production in South Carolina, and to go forward with experimentation with a new gas type, yet unproven system, in Idaho.

I, too, would like to have both of those. I just want to say, Mr. Chairman—and I suspect that I have taken up all of my time—I think, with the good intentions that we have here this morning, all too often we come into these matters and we get all involved in the love feast and we all get involved in saying what a great job we are doing or have done in the past.

The facts of the matter are that this is a Budget Committee discussion and consideration, and there is no way we can have everything that we want. There is no way that we are going to be able to build simultaneously or experiment simultaneously on two plants to produce tritium, which is critically necessary, if we are going to continue to produce the D-5 missile and our submarines the way I think they should be produced.

We still have not come to the understanding, Mr. Chairman, of the sacrifices that we are going to have to make, and therefore, from the information that I have heard thus far, I think we have done a great deal to emphasize the critical need to improve the national defense of this country, of which these two gentlemen have been a critical part, but we have had very little of substantive suggestions about what we are going to do to meet the budget deficit and Gramm-Rudman-Hollings targets, which I think is the main concern of most of the members of this committee.

I have no questions for this round. Thank you very much.

Chairman **Sasser**. Thank you, Senator Exon.

Senator Gramm.

Senator **Gramm**. Mr. Chairman, I do not know where Senator Domenici went but let me welcome you, gentlemen. Senator Domenici says this is the best macro discussion of defense policy that he has ever heard, and knowing that he has heard lots of them, it must have been pretty good. I am sorry that I missed it, but I am already convinced.

I think the plain reality we are looking at here is that, from the point of view of defense, this is the toughest budget that we have had in 10 years. This is the toughest budget in 10 years on defense, in terms of what is happening to the defense sector of the budget as compared to the non-defense sector.

As I look at the budget, if you take out debt service, which we are paying as a result of past deficits, and if you take out social security and then break the rest of the budget into defense and non-defense, this is the first year in a long time where the proposed rate of increase in defense spending is almost zero, and the proposed rate of increase in other programs is 3 percent, roughly, and

I cannot see how you can argue, given that breakout, that defense is the problem in this budget. In fact, we could meet the Gramm-Rudman-Hollings targets 1 year sooner if we treated the rest of the budget like we are treating defense.

I personally do not see defense as the source of the problem in this budget. I think the President has already made the tough choices in defense. I think if one wanted to be real tough about it, he might say that he has not made similar tough choices in the other areas. But the bottom line is he has submitted a budget that meets the targets.

Let me ask both of you of your assessment of further defense cuts. Let's ignore for a second the fact that the Armed Services Committee and the Congress will not buy the things you say you need, that we are going to have, as we always have, a "pork orgy" as Congress cuts things you ask for and builds things you do not want. I never understand why the media and the public are so outraged at some little hoodlum who cheats on a hammer, and yet they let billions of dollars be ripped off in the name of policies and nobody is outraged about buying anthracite coal and stacking it 45 feet high along the expressway, or whatever.

But let me ask the question: If Congress should decide to go substantially below what we are looking at here, could you just give me a summary of your concerns as to what the impact would be? And then—I will be brief, since Senator Domenici stepped out and he is ahead of me—if you will just give us that brief outline, I will be satisfied.

Mr. TAFT. Senator, let me try a few of those. I have to say at the outset that we are not even now at the level that President Bush has proposed. We are engaged in that work to take out things to get there. We are looking at everything. We are looking at, as the Chairman said, and as Secretary Carlucci advertised last year, force structure, brigades, ships, and air wings. We are looking at procurement. We are looking at readiness and we are certainly looking at sustainability.

You cannot reduce the defense program that we submitted by 4 percent, which is what is involved here, without affecting virtually everything to some degree. That is what we are looking at just to get to President Bush's level. We will have those proposals for the Congress to consider.

To go further would involve just more of those things, and again, I would single out force structure because of the priority that we must give, as the chairman said so eloquently, to readiness if we are going to have the quality of people that we want that drives you to a smaller force.

Senator GRAMM. Well, let me just urge you, Mr. Secretary, and urge Admiral Crowe and then he can take the rest of my time to respond, it is very important, as Congress debates these defense numbers, that the debate not simply become an abstract debate about numbers, that people have a clear understanding of what they are cutting and what the impact of those cuts will be on the national security interests of the Nation and on their individual States and districts. And the better job you can do of coming in with proposals as to how you would want to take the cuts, if in fact they are made, the better off we are going to be in that debate.

Mr. TAFT. Well, Senator, I can say that this year you are going to have a better way of understanding that question than perhaps you have had in previous years, because by the end of April, when the President's budget review is completed, you will have before you a description of what is missing to meet the initial reduction that President Bush has acquiesced in. You will find that that is programmed, that is real things, that is procurement, weapons systems and forces.

Anything below that will be more of the same, but you will know for sure, and it will be set out for you in the hard light of day, and for my own part, I am concerned about the nature of those reductions.

Perhaps Admiral Crowe would like to elaborate.

Admiral CROWE. Senator, if I could just say something that always distresses me in these kinds of conversations when we talk about what we are going to cut and looking to the future, there seems to be an implicit assumption in many people's minds that everything is rosy today, so now we are looking for what we can give up. The Joint Chiefs of Staff have testified for a number of years that the risk is higher than it should be and that we have some major deficiencies and have had for a number of years, and I can list some of those and I would be happy to furnish for the record for you a more detailed and a more specific list.

We have some major sustainability shortages, both in modern munitions and in just plain everyday munitions. We have it particularly in Europe, we have it in the Pacific, we have some very serious deficiencies in our combat support and combat service support units and our ground forces, we have some problems and they are getting worse in Reserve unit manning, which is part of our total force, we have some sealift shortcomings, we need this mobile missile in the strategic part of our armed forces, as I said in my statement. That is the most serious problem we have, a mobile missile decision, and to move ahead with it. The number one priority, which Secretary Carlucci stressed last year, which he has written an article about and which I think Secretary Taft and I agree on now, is an ASAT capability, which we do not have and we are trying to get it. We need these binaries and chemical weapons. We need more force structure in Europe, and we need survivability for our DCA and NSNF in Europe. These are representative examples.

I would like to just say one word about what Senator Exon said. In my own view, the number one priority, if we are looking at whatever we are doing, is to keep our strategic forces, which are the cornerstone of all our military, healthy. Now, Senator, you can do that with any number of reactors or as few a number of reactors as you want to, but if we do not have an ample and sufficient supply of tritium, that is going to affect our strategic cornerstone, and in my view that really is a serious matter, and it is imperative that we not have that happen.

Now, if there are better ways to structure it than DOE has recommended, I can live with that, but we must have a sufficient and ample supply of tritium to carry out the modernization of our strategic forces, and I would defer to Secretary Taft, but I think the general attitude of the department is that we are willing to sacrifice other things to be sure that is true.

Is that helpful, Senator Gramm?

Senator **Gramm**. That is very helpful.

Admiral **Crowe**. And I will be happy to furnish something to you for the record.

Senator **Gramm**. If you would do that for the record, Mr. Chairman, if we could have it in the record, I think it would be helpful.

[The information referred to was deleted by DOD.]

Chairman **Sasser**. Thank you, Senator Gramm.

Our distinguished ranking member has been in and out this morning and has not had an opportunity to question, so we will turn to Senator Domenici, if you have some questions.

Senator **Domenici**. Thank you very much, Mr. Chairman.

Let me start with something that is a bit more parochial than the issues we discussed, and then I will move to a couple of those that are general in nature. First, let me say that, while I was not in attendance when you completed your statement, Admiral, I want to commend you for it. And, frankly, I want to commend both of you. I think perhaps practice makes perfect, but I believe you have done an excellent job of laying out the alternatives that this Congress and the American people have with reference to the defense of this country and their freedom, and I compliment you profusely for the way you have handled it.

Having said that, let me talk a minute about base closures, just from the standpoint of some of the concerns. I am not going to complain about base closures. I understand there is a little bit of that going on. In my State, we close one base while two other bases increase. Nonetheless, there is a growing concern that once the plan is put in place, DOD might not follow through with the impact spending required to accommodate the plan.

For those that close, we need to furnish the economic transition money, and for those that increase in size, we have got to furnish the recommended improvements for those installations or we will not have accomplished the goals of base closure.

So, I would like to ask, are you convinced, Secretary Taft, and is the defense budget plan committed to the proposition of not only the closures, but implementing the game plan for closures, both with reference to closures and where additional missions or partial missions are being added to facilities, to forthrightly attempt to get that money so we can accomplish the overall plan?

Mr. **Taft**. The answer to that, Senator, is that we are absolutely committed to that. In fact, in the budget we submitted in January, we allocated some half a billion dollars in 1990–91 for the closures. To begin with, these closures cost money. The savings come in the subsequent years.

As it happens, we had to develop these figures before the specifics of the Base Closure Commission were available to us, the timing of that being prescribed in the statute. If it turns out that the Base Closure Commission estimates are correct, we will not need all of the money we had set aside for that in fiscal 1990, given the number of bases that they proposed. I think their minimum estimate actually comes to about $300 million, rather than $500 million in the near year. But I can assure you that that money will be there.

We understand that it takes money to save money, and frankly this is an investment that the Department has been waiting 10 years to make. We have not closed a base in 10 years, but we have proposed closing many. We have a very good shot at it, we have got to see this thing, it takes a bit of money, we are prepared to spend it.

Senator DOMENICI. I have only one suggestion, and it applies more to you, Mr. Secretary, than the Admiral. I understand in your business that you use words like "take out." I submit that wherever you have the words "take out," that you ought to substitute the word "cut," because if it is not that, then it is not understood.

You see, what has happened up here in the first 5 years of this budget, when Congress would set about to reduce the request dramatically in the appropriations process, there were a lot of available buffers around. While they were not known by everyone, they were known by the time the process was completed. We had, if you recall, huge overestimates of the cost of oil, which were reasonable because the price dropped precipitously. We had inflation add-ons to the procurement system and, because of competition and good procurement, that inflation add-on was not needed and so we could use that money in our final effort to get what you needed.

It is my understanding that those days are long gone, and that what the military now has is a proposal that they would implement right now that meets the needs of the United States defense, and we are going to have to change that and when we change it we are going to have to cut from that to even accomplish President Bush's recommended number.

I cannot urge strongly enough that you make that imminently clear. I think it is so easy for us to fail to understand the problems you have. It is very difficult to maintain peace and for people to understand the expenditures for defense that are peaceful in nature. We are much better at fighting a war than we are fighting peace in this democracy. I urge that you make your case as soon as you can. We understand enough, I think, to proceed with our job here.

Much is said about the recent procurement violations which ended up with indictments, arrests and the like. I have another complaint, Secretary Taft. I think that the history of the Reagan defense build-up, with reference to procurement enforcement, is totally misunderstood. People think the abuses took place with immunity. They do not believe anything happened to anybody that cheated out there. I believe you can never stress enough the efforts that have taken place to get those who cheat, to prosecute them, to disbar them, and whenever you can, it seems to me, we ought to be reminded of what you have done to correct these problems. That brings me to the last scandal that hit the American people just prior to the last campaign, in my opinion, like a bombshell.

It came about when things were rocking along reasonably well. I believe there is a gross misunderstanding of the cost to defense of that last round of criminal activity. So I ask you, Mr. Secretary, if that is so, how can you describe it to this committee, and if you are going to make the defense whole in terms of those scandals, how are you going to do it and are you forcing those who violated the law to pay substantially for their misdeeds?

Mr. TAFT. Senator, there is no question that we are. The purpose of the investigation is to identify anyone who may have improperly charged or taken advantage of the Defense Department and to not only get them behind bars, if that is where they belong, but to recover for the government the full amount of what it may have lost and more. The more includes the costs of our investigation, and those have been routinely included in every settlement that we have reached, as well as the amount that may have been lost to the government, and on top of that criminal and civil penalties in significant amounts.

We have an invariable practice and policy in this regard. We have, as I mentioned in my statement, been applying this over the years. We just recently received a payment from the Sundstrand Corporation of $189 million for what had been $120 million taken by them, through mischarging. So, from a financial point of view, we are made whole and you can be sure that we will always be made whole.

I have to say that this is me—even making us whole gives me no pleasure. We have to stop this right away, and in the strongest possible terms indicate to the contracting community, and our own employees—because some of them have been implicated in this and pled—that there is no place for this type of activity in our Department, or in any Government procurement. That the penalty will be severe, and that they will be spending a lot of time where they would rather not.

Senator DOMENICI. Thank you very much.

Chairman SASSER. Thank you, Senator Domenici. Senator Conrad.

Senator CONRAD. Thank you, Mr. Chairman. Welcome, Admiral, and Secretary Taft. I have enjoyed the time I have been able to spend in the hearing listening. I was sorry to have missed your testimony, Secretary Taft.

I have had a chance to work with you over the last year on the burdensharing amendment, and I want to publicly commend you for your effort in that regard. I think you have done good work for the country and have faithfully pursued our allies in an attempt to persuade them to do more, and I think that effort should continue.

Again, I want to thank you for the effort you have put forward because it has been substantial and it has been helpful.

Mr. TAFT. Thank you, Senator. It has been a pleasure to work with you in that connection.

Senator CONRAD. One of the comments I wanted to follow up on, Admiral Crowe, is the analysis of peace through strength working, I think, we can all conclude that it does work.

I want to explore one other area. It seems to me one element of strength is the economic strength of our country. You and I have had a chance to visit about this before.

I personally am persuaded that one of the most important things we can do is keep America strong in every sense is the economic undergirding of this economy. Nothing is more fundamental than this.

I personally am concerned when I see a tripling of our national debt in a very short period, and massive trade deficits ongoing, and our movement from being the biggest creditor Nation in the world to being the biggest debtor Nation in the world.

No. 1, it sends a signal to the rest of the world about American strength.

No. 2, there is the reality of American strength attached to those facts. Number three, it creates a budgetary climate, like the one that we are experiencing, which makes it very difficult for us to sustain defense spending at the levels that we are currently having.

We are nowhere near balancing this budget. $150 billion is what we advertise as the budget deficit, but we are also borrowing from the trust funds, and I use the word "borrowing" very freely.

I would be interested in your analysis, from a military standpoint, on the basic economic strength and health of the country as being important to a projection of military strength.

Are those factors that you consider when examining other countries in terms of their military strength?

Admiral CROWE. Yes, there are, Senator, and I agree with what you have said. I think the economic pillar is a very important part of our national security. It is incumbent upon us to make efforts to keep it healthy.

The Defense Department is very aware of that. We are sensitive to that. As a citizen, divorcing myself from my position for a moment—what worries me most is whether the savings that I see people trying to generate in the budget go to the deficit, go to the problems that you are talking about, or go other directions.

As a citizen, I am very willing to sacrifice in many, many ways in order to do something about that deficit.

Senator CONRAD. But you have got to be persuaded that it is really going to go for deficit reduction, and not go for some other program some place.

Admiral CROWE. Absolutely. If I may just add one thing to that, Senator. It would seem to me, of course, the economic success of our country contributes vitally to our ability to field a capable military force. It works the other way around, too. The situation in Europe which has been maintained now for 40 years by our military presence there, has contributed enormously, incalculably, to our prosperity, to the success of our economy.

Our ability to project power in the Persian Gulf has contributed to our prosperity enormously. Our alliance with Japan, and our presence in the Pacific has been a security alliance, and has been I think at the bottom of the prosperity of the Pacific Rim, which in turn has contributed to our own economy's prospering, and these things go together. We cannot have one or the other. It is not a choice. We have got to have both, and I really think that we underestimate the contribution, frequently, that our security relationships with our allies have played over the last quarter century, 40 years, in enabling the world economy to grow, which is at the bottom of our own prosperity.

Senator DOMENICI. Would the Senator yield for an observation on that. Might you, Mr. Secretary, consider a third point?

The Soviet Union builds a strong military even when they have an inept economy. That is something to put into the equation, is it not?

Mr. **Taft**. This is the one thing that they seem, over the years, not to have neglected.

Senator **Domenici**. Thank you very much.

Senator **Conrad**. If I might just follow up. From my visits with the Soviet leaders, it strikes me that they have concluded that their weak economy is in part due to too many resources going to military spending.

I would be interested if either of you gentlemen have had a chance to visit with military leaders in the Soviet Union about that very subject.

Mr. **Taft**. I think that from the conversations that I have had, and experiences, that there is that feeling in the Soviet Union, that they have been paying a very heavy price for their military. It takes of course a very much larger share of their total wealth than ours does, and their standard of living is not as high as ours, so I can imagine they would be looking for ways to divert their resources to increasing that standard of living.

Senator **Conrad**. What is our best estimate on what they are devoting? Twenty to 25 percent?

Mr. **Taft**. The intelligence estimates would put it lower than that. I think it is more like in between 15 and 20 percent. There are differences.

Admiral **Crowe**. And of course the simple fact is we do not know, exactly, and the simple fact also is they do not know, either. [Laughter.]

Senator **Conrad**. So you cannot just ask them.

Mr. **Taft**. They sometimes ask us.

Admiral **Crowe**. Senator, I had some opportunity to talk to Marshall Akhromeyev last summer. We spent about 20-some hours talking. In all candor, I think we talked more about capitalism than we did about his system. He told me that the Soviets originally thought capitalism was very simple, and then they started doing business with us and lost their socks, and decided that maybe capitalism was very complicated.

But obviously, at least in my view, Mr. Gorbachev wants more freedom and latitude when he is dealing with his budget, allocating it, dividing it up, and he has had to try and wrest some control away from the military.

On the other hand, I think the general opinion among experts—and there is always controversy on every point—is that this is not totally, however, to generate just benefits for the civil side of the economy or for modernizing the way they do business. The Soviet military has in mind, as do many of the Soviet leaders, that if they do not modernize their industry and their technology the Soviet military is going to get behind.

And they have in mind strengthening, in a qualitative sense, their military power as well as trying to improve the general situation. Whether it will come out that way remains to be seen.

Senator **Conrad**. Well, my time has expired, Mr. Chairman, but I would just make the observation: I have become convinced, since visiting Soviet Union, that they are in deep economic trouble. I think all of us recognize that. They have budget deficits that are now estimated to be $250 billion a year, and they sense that they are going to have to do things that get their economy back on track, if they are to be a world military power.

And that leads me to the conclusion that if you do not have a strong economic base you are not going to be a military power very long, and I think the Soviets perhaps have recognized that, and that has tremendous implications for us as well.

Mr. **Taft**. Yes; I think that is the view that they take. I would only say that at the levels that we are speaking of in the United States, as a support for our defense, around 5 percent of our economy—this is not a large burden. We have a lot of history, 40 years since the war, during the war, that shows that this is not a level that imposes an unacceptable burden on our economy.

As I say, the 1993 figure that President Bush is proposing within his balanced budget is as low as all but 2 years, that we have ever seen. So we can manage this if our political leadership will go about it. It is not an increase in their share of the defense budget that is causing our problems. It is getting lower.

Senator **Conrad**. I would just amend one thing that you said, and that is balanced budget. We are so far from a balanced budget we cannot even see there from here.

The budget that has been presented by the President meets the Gramm-Rudman targets by using optimistic economics, but it is not a balanced budget and we certainly do not want to mislead anybody that we have got a balanced budget. It is not, and if we factor in the trust funds, we are a long way from home.

Chairman **Sasser**. Thank you, Senator Conrad. Admiral, I have been handed a suggested question here to ask: If your comment about sacrifice extends to increasing taxes. I am not going to ask you that question because——

Admiral **Crowe**. It is above my pay grade, Mr. Chairman.

Chairman **Sasser**. Well, that is a good answer. You do not want to get into that thicket anyway.

Gentlemen, a leading administration official indicated, some time ago, that perhaps the Department of Defense might ought to prepare itself for sequester. I think this same official has since indicated that he might have changed his view on that.

But with regard to sequester under the Gramm-Rudman-Hollings Act—and I think Senator Hollings is about to get into the posture where he wants to take his name off that legislation—but if we go to a post-sequester defense budget level, what I am looking at here is roughly $285 billion of budget authority, and $288 billion in outlays, if one assumes that the military personnel account is exempt from sequester.

Now the post-sequester funding for defense is below President Bush's proposal by nearly $25 billion in budget authority, and $13 billion in outlays.

Most of the reductions would be taken in the O and M budget, so-called readiness account. What would be the Pentagon's position on the whole proposition of sequester? I can imagine what your position is going to be but we want to get it on the record here.

Mr. **Taft**. Senator, our position is——

Chairman **Sasser**. Mr. Secretary, could I interrupt you for just one moment.

Mr. **Taft**. Yes.

Chairman **Sasser**. And ask you, could we reasonably absorb a sequester and still fulfill our national security commitments? That is really what I am coming to.

Mr. **Taft**. Senator, we are opposed to a pattern that would result in a sequester, for two reasons. One is the one you just alluded to. But the first, and most important, is that the $285 billion for the defense program in fiscal year 1990 is not adequate to do the job.

It is not adequate to provide the type of military force that fiscal year 1990 requires us to field to maintain our security commitments around the world.

The second reason is that a sequester operates across the board, and suddenly, and disrupts every program in the Department.

So that all of the ideas of efficient management, and good buying practices go out the window, because each program is treated the same under the sequester as it comes, whether it can afford it or whether it is a binding contract which will have to be broken, with penalties, or not.

So from a management point of view it is a double disaster, let alone the level that you are speaking of. But we have, as I said, not yet made it to the $299 billion level. There will be many programs cut to get there.

To take another $14 billion out to get down to $285 billion will simply not buy you the force, in terms of quality, or size, that we require.

Chairman **Sasser**. Do you want to amplify on that at all, Admiral? Don't feel a necessity to.

Admiral **Crowe**. No, I do not, Mr. Chairman. I agree with him wholeheartedly.

Chairman **Sasser**. Yes; Mr. Secretary, if you would ask your assistant to pop up your second chart there. It is the one that has got your—yes, that is the one I think. Yes, that is it.

Mr. **Taft**. This is the Reagan budget, Bush budget?

Chairman **Sasser**. Yes; Mr. Secretary, looking at the Bush budget for fiscal year 1990, there appears to be an unusual disparity there between budget authority of $299.3 billion and outlays of $291.2 billion. How do you explain that?

Mr. **Taft**. Well, this would be the effect of prior years. As you know, Mr. Chairman, we have many programs that are authorized and the funds appropriated to be expended over 2 years, if they are research and development, and over 3 years if they are procurement.

When we buy a ship, for example, we appropriate the full amount to buy for the ship, to fund the ship, but then we build that ship over 5 years and the outlays are only given to the contractor as he delivers the work.

So it is in the prior years, that would be the explanation for that very small rise. Likewise, of what is being asked in 1990 for a ship, for example, a submarine, very little will actually show up in the outlay column.

We are at a stage now where, after 11 percent has been taken out of our program over the last 5 years, the outlays from prior years tend to be coming down, and even if we have a significant increase in budget authority, it does not result in a large amount of outlays because it takes some time to spend it, particularly if it is in the procurement accounts.

Chairman SASSER. I must say to you that that disparity has raised some eyebrows around here.

Mr. TAFT. I think we are pretty confident with that projection of $291.2 billion. I believe there is some difference over the 1989 calculation with the CBO, but I think the 1990 calculation is pretty well agreed.

Chairman SASSER. I am advised that CBO has probably got you outlaying about $3 billion or $4 billion higher in fiscal year 1990.

Mr. TAFT. In 1990?

Chairman SASSER. Yes; than your chart is showing there.

Mr. TAFT. Yes. That may be right. There is a disagreement, but these are very difficult to calculate, and I think the experts argue among themselves just as much as I, as a non-expert. I do think I would be able to contribute.

Chairman SASSER. There was an article authored by John Lehmann, in which he was making the case that in a time of declining defense budgets, that we needed to move more rapidly away from an active force, and in the direction of a reserve force.

He made the comment that we do not need 18 active and 10 reserve Army divisions. The ratio should be the reverse, according to him. Instead of a 600-ship Navy, of 550 active and 50 reserve ships, the ratio should be 450 active and 150 reserve.

He says we need to reverse the ratio of two-thirds Air Force active wing to one-third reserve wing, to rather, half and half active and reserve Air Force wings. He said instead of five active division equivalents in the Marine Corps, which really stunned me—because he says officially there are only three divisions in the Marine Corps, but actually, apparently there is a manpower, according to him, equivalent of five divisions. That we ought to have a ratio of three active and three reserve.

I would be interested in getting your comments on that, Admiral.

Admiral CROWE. Well, Mr. Chairman.——

Chairman SASSER. If I could sharpen the question just a little bit. As to the feasibility of moving more in the direction of reserve forces, away from active-duty forces, as we look towards perhaps trying to reduce defense spending.

Admiral CROWE. I think the first question you have to ask yourself, is, if you save money doing that. In some places you do not save money. In certain places you actually move forces to the reserve, spend more money and get less defense—less responsive. It is in other places you do save money. So it is not an even situation across the board; it is mixed.

From our standpoint of readiness and responsiveness, of course, we have been looking at this now—we do every year, we always look at this. There are certain functions that lend themselves—for example, I think the most graphic one in the country is the transportation command where a large, large percentage of our transport assets are handled and flown by the reserves, because we can schedule, because they have an expertise in civilian life that lends itself directly to this, and they are very good and perform very well, and also are very responsive. There are other areas where it just does not work out that way.

I am a little surprised at his just blasé way of doing it across the board.

Chairman **Sasser**. Yes; I am a little surprised at that myself.

Admiral **Crowe**. I do not think I would necessarily recommend that. On the other hand, if we are in for substantial cuts we will be looking at those kinds of proposals in a very serious way. But you give up something, and what you give up and how much it costs must all be considered.

We are pretty close right now. There are perhaps some naval forces that we can look at more, but the Army savings are not that great. You really get into the problem.

Incidentally, we have, as I mentioned in the list I gave Senator Gramm, some very serious problems with the reserve manning right now.

Chairman **Sasser**. You mean with cadres for reserve or just manpower for the reserve?

Admiral **Crowe**. Manpower.

Mr. **Taft**. If I could just elaborate a little bit, Mr. Chairman. In the Army, in the last decade, we have almost doubled the size of the reserve. It is now larger than the active force.

The active force has gone down by some 20,000 people, and it may go down further as a result of these reductions that we are presently mandated to meet.

So the idea that we have 18 active divisions and 10 in the reserve does not accurately describe the force structure of the Army which is half and half, when you count bodies.

A lot of those so-called active divisions have round-out brigades, a round-out from the reserves that will be part of them.

We are half and half, right now, in the Army. We have more people in the Army reserve than in the active force, and it is getting very tough to keep them there, to train them, to equip them, and attract them. We are attracting people in record numbers. We are also, I am sorry to say, losing them in record numbers. It is a very tough thing to keep that force up.

Chairman **Sasser**. The hour is getting late and I will turn to Senator Domenici for any further questions he might have.

Senator **Domenici**. I will be very brief. With reference to the DOE part of defense, the National Laboratories and nuclear clean-up, both the Reagan budget and the Bush budget contain increases for the National Laboratories. The way we budget around here, that could be made up of the National Laboratories and their budgets, and also the clean-up and modernization of the nuclear weapons complex.

Is it the Department's intention that the $360 million increase for clean-up and modernization of the weapons complex be taken out of the National Laboratories' budget, or is it the intention that it be new funding for that program, and not part of the National Laboratories' budgets?

Mr. **Taft**. Senator, as you know, that is more for the Secretary of Energy to say, but I would say our position to him would be that he not fund that at the expense of the National Laboratories. We have taken that position to him and presented it. I think the National Labs need to be supported at the Reagan budget level.

Senator **Domenici**. Let me just make sure that the record is clear concerning the Congressional Budget Office numbers and, estimates. They are technical adjustments, so as to speak. I want to make two points.

It seems to me that you have already told us that in the procurement accounts you are asking for up-front budget authority which is a significant increase because you want to save money over the 5 years in procurement.

It appears that as that disparity between budget authority and outlays grows, that right there, you have about $2 billion that is budget authority for procurement which will not spend out very rapidly. Is that not correct?

Mr. **Taft**. We would probably have even more than that amount, Senator.

Senator **Domenici**. Right. My second point is, if you read the record carefully, when the chairman said to you the Congressional Budget Office estimates the $291 to be $3 billion to $4 billion more, at one point you said, "That's right." I would like to make sure we understand.

You were saying, "That's right, CBO says that." You are not saying they are right?

Mr. **Taft**. I am not in the outlay estimating business, Senator. Our view is that this number is correct, the $291.2 billion, and we stand by that. As I understand it these are technical considerations, very complex, and actually, I would say if there is one thing you can say for sure either about CBO's or our estimate, it is that they are both wrong.

Senator **Domenici**. My last comment concerns the economic discussion—and Admiral Crowe, you were asked about economics, and how concerned you were about a vibrant American economy in your evaluation as chairman of the Joint Chiefs of Staff.

I would merely suggest that there is one further statement that one might make, and that is that democracies like the United States, frequently, in the past history, have, while having a very vibrant economy, failed to adequately fund defense.

I do not think it always follows that if we get the domestic economy problems taken care of, we would necessarily adequately fund defense, and I think you know more about that than I.

Admiral **Crowe**. Well, absolutely not, Senator. As a matter of fact in the course of my responsibilities, I have gone back and looked at congressional testimony before the Spanish American War, and before World War I, and before World War II, where the career military was warning this country, in grave terms, what would happen if they went to war.

They were ignored, and in this century, we have lost a great many lives and a great deal of treasure, unnecessarily, because we did ignore those warnings.

Senator **Domenici**. But the point is they were not ignored because we had an inefficient economy——

Admiral **Crowe**. Not at all.

Senator **Domenici** [continuing]. Of insufficient monies to pay for what was being recommended?

Admiral **Crowe**. That would be my view, Senator.

Senator **Domenici**. Thank you very much.

Chairman **Sasser**. Mr. Secretary, Admiral Crowe, thank you very much for appearing here before us today and representing the Defense Department so ably, and giving us the benefit of your views. These hearings are closed.

Oh, before closing the hearings, we do have questions for the record from Senator Nickles, and also from Senator Kasten, and we would ask you to reply to those in an expeditious manner.

Mr. **Taft**. Mr. Chairman, we will be sure to do that. Thank you very much for the opportunity to appear.

Admiral **Crowe**. Thank you, Mr. Chairman.

[Whereupon, at 12:10 p.m. the committee was adjourned, subject to the call of the Chair.]

WRITTEN QUESTIONS FROM SENATOR KASTEN TO SECRETARY TAFT AND THE RESPONSES

Question 1. As much as $8 billion in untied credits were provided by the West to the Eastern Bloc last year. That figure is likely to increase significantly given Gorbachev's active solicitation of Western credits. Secretary Taft and Admiral Crowe, are you concerned about this?

Answer. Not all East-West credit transactions are benign. Credit flows that have harmed Western security include Western government trade-related subsidies, that before 1982, indirectly underwrote in part the Soviet military buildup, a practice that, for the most part, has been eliminated by the Allies, thanks to a 1982 Export Credit Arrangement within the OECD.

Another example of imprudent lending involves commercial bank credits not earmarked for specific uses. These have the unfortunate side effect of being easily divertible for purposes harmful to US security, or misallocated to noncompetitive industries, that add to the debt burden of the borrowing country.

Question 2. Are our European allies and Japan making it easier for Gorbachev to avoid making the hard choices and pulling back from defense spending? Is the West financing Peristroika?

Answer. Most credit extensions by Western countries to East bloc countries, in support of East-West trade, do not contribute to the defense burden of the NATO Alliance, although we must keep in mind that the Soviets routinely use their legal trade with NATO countries as a platform for industrial espionage and technology theft.

Question 3. Shouldn't the Congress and the Administration focus on limiting untied credits to the Soviets—as a part of the burdensharing debate—instead of unilaterally cutting America's defense budget?

Answer. The Administration firmly believes that prudent, tied lending to the USSR on commercial terms, free of any government guarantee or subsidy, in support of trade in nonstrategic goods, is consistent with the evolving political relations between our two countries.

During 1988, United States representatives have repeatedly expressed our concern to the Allies about the dangers associated with providing large, untied, general purpose loans to Soviet Bloc countries.

We have achieved a consensus with our allies in favor of improved monitoring and review of East-West credit flows and are making some progress in that regard. Secretary of the Treasury Nicholas Brady has taken the lead on this issue, during 1988, and plans to have it placed on the agenda of the Paris Economic Summit, in 1989.

WRITTEN QUESTIONS FROM SENATOR NICKLES TO SECRETARY TAFT AND THE RESPONSES

Percent Real Growth

Question 1. In reducing U.S. defense spending from the 2 percent real growth proposed by President Reagan, down to the 0 percent real growth level recommended

by President Bush, what effect will these cuts have on readiness accounts such as aircraft repair, ammunition procurement, and training?

Answer. The Department is presently considering various alternatives to reduce the January budget by the necessary $6 billion. These are no easy choices, especially in light of the significant reductions that have already been made to the FY 1990 budget plan. We plan to achieve a reasonable and affordable program, balanced between manpower, force structure, readiness, procurement, research and development, and military construction in order to maintain long-term national security goals with the least possible increase in overall risk.

Question 2. Have you seen any evidence that Soviet defense spending is slowing, or that Soviet military doctrine has changed?

Answer. Evidence exists of Soviet efforts to trim some military expenditures. The Soviet Navy, for example, has reduced its out-of-area operations, probably in response to both economic and operational requirements, and is scrapping a large number of obsolescent submarines and surface ships. Articles in the Soviet military press indicate some ground force units have been given specific goals for reducing the use of fuel and other resources. The Soviet withdrawal from Afghanistan and weapon reductions under the INF Treaty provide modest savings in operational expenditures and procurement. Longstanding Soviet efforts to extend the service life of various weapons apparently have been given more emphasis. In addition, Soviet defense industries have been assigned higher targets for the production of civilian goods to support economic modernization. At the same time, however, overall military spending has continued to grow since 1985. Although changes in spending on procurement and research and development are difficult to detect immediately, available evidence suggests major weapon programs initiated before Gorbachev came to power have proceeded on track. As these programs have entered series production, total procurement outlays have grown at a somewhat faster rate under Gorbachev.

There are indications of both change and continuity in Soviet military doctrine. The political (i.e., theoretical) element of Soviet doctrine now emphasizes war prevention and the reduction of surprise and offensive capabilities. Indications of a change toward a more defensive doctrine include the recently announced troop and weapon reductions, which, if implemented, will degrade ground offensive capabilities significantly in the forward area and modestly overall for the Atlantic to Urals zone. In particular, a Soviet surprise or short-warning (less than 1 week) attack, already a low likelihood, would be viewed by the Soviets as unviable against current NATO forces; even greater reinforcement activities would be expected prior to an attack. The impact of the announced reduction of Soviet aircraft will depend on the numbers and types included. The Soviets probably will withdraw a mix of aircraft. An important decrease in offensive capability would require significant reductions in deep penetration aircraft, although the Soviets have not indicated that this is their plan. In addition, Soviet exercises and training in the Western Theater of Military Operations now emphasize defensive operations on the conventional battlefield, although the Soviet concept of defense is not static but includes the counterstrike and counteroffensive.

Despite the reductions the Soviets are providing for the rapid reinforcement of the forward area through retention of the logistic support infrastructure composed of large, predeployed stocks of ammunition and petroleum, oil, and lubricants. The ongoing reorganization of Soviet ground forces will probably produce smaller, more mobile, modernized units with increased combined-arms capabilities appropriate for both the offense and defense.

Indications of continuity in Soviet military doctrine include continued improvements in military command, control, and communications (C3) capabilities through hardening, mobility and redundancy; ongoing modernization of Soviet strategic nuclear forces; new Soviet emphasis on strategic bomber/ALCM forces, in keeping with a trend toward a robust nuclear triad; modernization of Soviet short-range nuclear forces; and an increasing number of military-related space launches.

Senator NICKLES. Would these Soviet military spending reductions, if actually implemented, reduce total spending, hold it steady, or simply reduce the rate of growth?

Answer. President Gorbachev and other Soviet officials have said the military budget will be reduced by 14.2 percent over the next 2 years. According to the Soviets, the 14.2-percent cut refers not to the small announced "Ministry of Defense" budget (20.2 billion rubles in 1989), but to the broader military (national security) budget, which Western estimates place at 7 to 8 times the announced budget. Several ambiguities remain in the Soviet statements. It is not specified whether the budget cut is from 1988 levels or from future/planned growth. The Soviets have not provided a ruble figure for the budget cut or for their total military budget. Therefore, a definitive statement on the effect of the budget cut is not possible. Nevertheless, the budget cut probably represents Gorbachev's intention to cut the level of total military spending over the next 2 years and start the process of reducing the burden of the military on the economy. Gorbachev has a strong incentive to cut military expenditures to help reduce the burgeoning deficit in the Soviet state budget and to provide more resources for civilian economic modernization. Moreover, the recently announced Soviet troop reductions set the stage for reduced demands for many categories of military goods and services.

Question 3. Should the U.S. wait until we see concrete evidence of real Soviet defense spending reductions before cutting U.S. defense spending?

Answer. We have to take into account many factors in deciding what the level of defense spending should be for the U.S. We cannot base decisions solely on what the USSR is spending on its military forces. We made significant increases in the DOD budget in the early 1980's, but since 1985 we have had to cut back on defense spending, even while Soviet military spending continued to increase at an estimated 3 percent a year in real terms. The President has requested that the Defense budget grow by 0 percent in FY 1990, 1 percent in FY 1991 and 1992, and 2 percent in FY 1993.

Question 4. Would these Soviet military spending cuts, if actually implemented, reduce total spending, hold it steady, or simply reduce the rate of growth?

Answer. General Secretary Gorbachev, according to TASS, told the Trilateral Commission on 18 January 1989, that "the military budget will be reduced by 14.2 percent." He did not specify the time, but the remark was made in the context of force reductions being made during 1989-1990. Gorbachev's statement suggests that total spending on the military will be reduced by 14.2 percent by the end of the two year period, but we do not know for certain that that is what he intended. We will want to listen for further details and watch to the extent we can what actually happens to the Soviet military budget. The Soviets have never fully disclosed publicly their military budget; instead, they have announced a figure that they now admit represents only a portion of their total military budget—a relatively minor portion of the budget in our estimation.

DEFENSE BUDGETARY CHOICES FOR THE 1990'S: VIEWS OF OUTSIDE DEFENSE EXPERTS

TUESDAY, MARCH 14, 1989

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Washington, DC.

The committee met, pursuant to notice, 1:15 p.m., in room 608, Dirksen Senate Office Building, Hon. Jim Sasser (chairman of the committee) presiding.

Present: Senators Sasser, Exon, Wirth, Fowler, and Conrad.

Staff present: John L. Hilley, staff director; and Doug Cook, assistant director for national security and foreign affairs.

For the minority: G. William Hoagland, staff director; and Richard Doyle, senior analyst for defense.

OPENING STATEMENT OF CHAIRMAN SASSER

Chairman SASSER. The committee will come to order.

Gentlemen, I want to welcome you to the committee today. It is a pleasure to have you all. This morning, we heard from the Acting Secretary of Defense, Mr. Taft, and we heard from the Joint Chiefs of Staff in the person of Admiral Crowe, their views on the need for real growth in the defense budget and the possibility of achieving savings in the defense budget, and the impact on security policy and alliance relations of the Gorbachev initiatives and the decision by the European Economic Community to "unite" in 1992.

This afternoon, we have before us three outstanding witnesses who will share with us their views on these important issues, as well as perhaps their thoughts on how to get the most defense for our dollars.

These witnesses are James Woolsey, who was formerly Under Secretary of the Navy and a key member of the Scowcroft Commission. Barry Blechman is a former Assistant Director of the Arms Control and Disarmament Agency, and has recently prepared an excellent study on the prospect for real reduction in conventional forces in Europe. Gordon Adams is Director of the Defense Budget Project at the Center for Budget and Policy Priorities, and has provided top-notch independent analysis of Pentagon spending for several years now.

As I said this morning we stand on the brink of a new era in national security relations. All over the world we see change from the political changes in the Soviet Union to the economic changes in the Western Pacific and in Western Europe.

We must begin to decide what essential ideas, truths and alliances we will keep from the past and what we will bring forward into the future. We must also recognize that these changes will occur whether we participate or not.

Our allies in Europe and Japan will continue to flex their economic muscle. The new leadership in the Soviet Union will continue to work to improve its political position in Europe, the Middle East and the Pacific. We can choose to lead or we can be left to follow. If we are to lead we will need an understanding of the past and a vision of the future. We hope these outstanding witnesses will help us develop that vision.

We are interested in hearing from you this afternoon. Mr. Woolsey, we appreciate very much you changing your schedule to join us here this afternoon. I thought we might begin with you, Mr. Woolsey, but if you need a moment to get your thoughts together there, we can move on to Mr. Blechman.

Mr. WOOLSEY. Mr. Chairman, they are as much in order as they will be, so I will be pleased to go ahead, if that will help.

Chairman SASSER. We will be pleased to hear from you.

STATEMENT OF R. JAMES WOOLSEY, FORMER UNDER SECRETARY OF THE NAVY, AND MEMBER, SCOWCROFT COMMISSION

Mr. WOOLSEY. Let me just talk for a few minutes informally, if I might. I am speaking principally from a document that I believe the committee has, which is a report that the current National Security Adviser to the President, Brent Scowcroft, and I prepared last fall when he was a private citizen for a group called American Agenda. It was a bipartisan set of recommendations to the incoming President, whoever he might be. Brent's and my section dealt with defense and arms control.

One portion of that deals with the defense budget, and our recommendations were made really independently of the overall budget level. The budget recommendations were designed to make some suggestions about long-range structural changes that could hopefully allow some defense budget savings. And I emphasize long range and structural because we did not intend these to be part of any annual budget drill, much less one that focuses on outlays, as the budget process under the 1974 act really must.

Indeed, some of these, several of these, recommendations would probably cost money in the short run because, like most investments that save in the long run, sometimes it is necessary to spend money in the short run in order to do that. But let me touch on them very briefly, and put a little bit of a gloss on what we said in our report to the incoming President.

We suggested that one thing that could help save substantial funds in the defense budget over the long run would be a conscious and planned—and I would emphasize planned—shift from active to reserve or cadre status for a number of units. Now, the units for which the greatest savings would occur would be ground force units, because they are the most manpower intensive. Unfortunately, the types of units for which reserve status works the best, historically has worked the best, have been units dealing with aircraft.

In all four military services, the reserve units and guard units that operate aircraft are normally quite fine. They are skilled; the aircraft are maintained well; it is practical for pilots who have other jobs to fly, say, a fighter aircraft only on weekends and still retain proficiency. And one can make some improvement, I think, in operations and maintenance savings over the long run by shifting some of these aircraft units into reserve status. But the larger savings would be involved in shifting ground force units, and that involves a structural problem because today our combatant ground force units are located almost exclusively, those that are in reserve status, in the National Guard. Consequently, they do not have active duty officers and noncommissioned officers serving in them.

The Marines operate their reserves differently. The 4th Marine (Reserve) Division is commanded by active duty Marine officers and noncommissioned officers. But the National Guard is different for historical reasons, having to do with its being the militia, with political reasons, and a number of others.

One of the things one is going to need to do if—as a result of arms control negotiations and reductions in forces in Europe or elsewhere, or just as a result of trying to save money—we move forces, ground forces, into a reserve status, is to look at some structural reforms of the National Guard, so that the active duty cadres of officers and noncommissioned officers have units to command.

In a lot of ways, the most important thing that was done for our military during the really poverty-stricken days for the Government of the 1930's was that the Bradleys and the Eisenhowers and the Pattons, the Stillwells, were kept in the armed services. And it was a difficult time to be in the military, but those important cadres and many, many like them were preserved. So I think if one does make reductions, it is important to look at some structural changes in the way the reserves and Guard are operated.

Chairman **Sasser**. A difficult time to be on the outside, the 1930's, too, Mr. Woolsey.

Mr. **Woolsey**. Excuse me, Mr. Chairman?

Chairman **Sasser**. A difficult time to be on the outside in the 1930's.

Mr. **Woolsey**. It was a difficult time to be everywhere. It was a difficult time to be in my home State of Oklahoma during those years, too, Mr. Chairman.

We also pointed out that with respect to forward-deployed American forces, there may be some cost savings possible from utilizing such naval deployments as, let us say, nuclear submarines armed with very accurate cruise missiles, as forward-deployed systems in some circumstances, rather than to rely so much on forward-deployed carrier battle groups with many thousands of people on board.

We did not suggest that that meant that it would be a good idea to take carriers out of the active duty force. Because in potential hostilities that may arise in much of the world, we are going to be in a situation in the future, I believe, in which we are going to need to be able to establish control of the air. And with the decreasing access to us of bases, and even overflight rights—even among our allies, not to speak of among merely friendly states or neutral states—the number of places in which we are going to be able to deploy land-based tactical air I think is quite limited, and is shrinking all the time.

Furthermore, land bases are becoming more and more vulnerable to tactical ballistic missiles, runway penetrating munitions, chemical weapons, modern Soviet aircraft in Europe, Soviet Spetznaz forces, and the like. So I think the future is one in which one is going to need the capability for naval air power, but it may be a future in which, with relations between us and the Soviets and the situation in some parts of the Third World changing character—hopefully for the better—we could maintain some of our carrier battle groups somewhat closer to the United States and save on some of the operating and maintenance costs. We could scrimp some perhaps on the number of surface escorts for them, assuming the carriers are going to be operating together rather than individually. Those are some of the types of areas in which one, I think, might, with structural changes over the long run, look towards some possible savings.

We also suggested that the United States today has four absolutely first-rate air forces. Each of the military services has a combat air force. The Army's is a rotary wing one, but, nonetheless, there are four air forces. We do not suggest that we get rid of one of them, which is what is sometimes suggested in discussions of this kind, but, rather, that for a number of potential applications, such as the attack of fixed targets, the conducting of surveillance or intelligence collection, unmanned aircraft may well be as effective as manned aircraft and considerably less expensive. Remotely piloted vehicles for some type of intelligence and surveillance missions, for example, can replace manned aircraft. And for attacking fixed targets, the accuracy of cruise missiles is coming to be extraordinary, indeed.

This is one of those areas, however, in which to save some money in the long run one is going to need to spend some in the short run, because the remotely piloted vehicles and the new cruise missiles and so forth need to be developed.

We suggested that training is an area in which there can be, I believe, a good deal of savings over time, principally by the increased use of simulators. The stand-alone simulators which the military now uses save a good deal of funds and flying hours and in some cases for the Navy some steaming hours.

It is coming to be possible—with the algorithms that can be used to reduce the amount of data that need to be transmitted for very accurate pictures and video-conferencing and the like—for simulators, relatively simple ones, to be networked together, so that one can, as I have done within the last few months, drive an inexpensive stationary M-1 tank simulator in Cambridge, MA, and be operating in formation and seeing exactly the same types of targets over satellite links as real tanks operating in Kentucky.

Those sorts of evolutions for training, for reserve units, for training with our allies and the rest, can save some substantial operating costs. But, again, not this year and not next year.

Finally, we suggested that a number of the savings that I think could be realized from such undertakings as I am sure you heard about this morning—multiyear budgeting, base closures, and the rest—are also potentially useful and could help hold down defense budget cuts for the long haul.

I would, however, candidly indicate, Mr. Chairman, that when Brent and I testified before the National Economic Commission, we both did testify that, because of the need to make some of these investments, to make some of these structural changes for long-range savings, we felt probably some real growth in the near term was necessary for the defense budget. Obviously, at lower levels of funding, which may turn out to be necessary from the country's point of view due to the deficit and all the rest of it, risks would have to be borne, and some of these reforms might have to be pushed at the expense of other spending.

My own squaring of that circle—since I am a private citizen and have no constraints on the solution I would come up with—in order to have what I would consider an adequate defense budget, as well as meet some of the other major domestic needs that I think the country faces, my own view—as I testified before the Economic Commission—would be to propose increased taxes, particularly on fuel consumption, particularly gasoline.

With that, Mr. Chairman, I will close, if I might.

Chairman **Sasser**. Thank you, Mr. Woolsey.

We will hear now from Mr. Blechman, please.

STATEMENT OF BARRY M. BLECHMAN, FORMER ASSISTANT DIRECTOR, ARMS CONTROL AND DISARMAMENT AGENCY

Mr. **Blechman**. Thank you, Mr. Chairman. I would like to begin by addressing the point that Mr. Woolsey led off with, which is the relationship between overall fiscal policy and defense spending, and then turn to specific aspects of how the demands that defense poses on the Nation's fiscal resources might be modified.

We all know that we live in an anarchic international system in which there is no central authority to settle disputes, or to protect individual nations' interests, and as a result of that, directly or indirectly, military power remains the ultimate arbiter, the ultimate means of protecting our security.

Still there is no certitude about how much should be spent on defense in any 1 year, just as there are no precise relationships between our military capabilities, and our ability either to deter war, or to prevail in one should it begin.

There are too many variables that play a role in determining the outcomes of military conflicts, and there are an even larger number of factors, many of which we understand only dimly, which affect the calculus of deterrence.

Now obviously, all else being equal, we would prefer to have more military power rather than less. If it were without costs, we would fulfill the Joint Chiefs' most ambitious plans for U.S. military forces.

But there are many other factors to consider. Sometimes, we have found we can gain greater security by mutually renouncing certain kinds of arms with other nations, as President Reagan demonstrated in the treaty on intermediate-range missiles a couple years ago.

At other times, the Nation's economic needs have to take precedence over what might otherwise be considered desirable military expenditures. In a sense, determining the aggregate size of the defense budget can be compared to an individual's decision about how much life insurance to buy.

While we all would like to provide our families with as much insurance as possible, there is no automatic formula to make that decision for us. It is a subjective judgment, depending on factors such as our personal assessment of risk, and a personal determination of how much insurance we can afford.

I believe we are fortunate, these days, in that we live in a permissive international environment. Under Mikhail Gorbachev, the Soviet Union is pursuing a more peaceful policy, cooperating to solve certain international conflicts that it previously had sought to exploit, reducing its military presence around the world, and adopting a more flexible position in arms-control negotiations.

The Soviet Union clearly would like to reduce the extraordinary burden of military expenditures on its own economy, and it is prepared to achieve that goal, even unilaterally, up to a certain point.

Substantial reductions in Soviet ground forces in Europe have been announced which, if they are implemented as described by Soviet spokesmen, would significantly reduce the threats posed to NATO in scenarios envisioning relatively limited periods of mobilization prior to an attack.

The Soviet Navy has substantially reduced the tempo of its operations around the world, and many expect a significant cut in the size of Soviet naval forces in the near future.

The U.S.S.R. is not taking these steps for altruistic reasons. They have good reasons of economic and political self-interest for their more accommodating posture.

Nor are there any guarantees that these reforms will continue. We know little, really, about the inner dynamics of Soviet politics, and there is little basis for confident predictions of either the imminent demise or the permanent rule of the new Gorbachevian regime.

In any event, international events, a rebellion in Eastern Europe, for example, could easily make current Soviet policies untenable, regardless of who remained in control in Moscow.

But the international environment is permissive in other ways as well. Within the last year, any number of previously intractable disputes suddenly made progress toward resolution. There is a de facto truce on the Persian Gulf. There is an agreement to curtail the international aspects of conflicts in Angola and Namibia. There is substantial diplomatic progress toward resolving conflicts in Central America, Northern Africa, and Southeast Asia, and even slight signs of some movement in the Arab-Israeli conflict.

None of this movement is guaranteed, and all of it could be easily reversed. Still the trend is very much in the right direction, an observation which we should keep in mind in evaluating proposals for U.S. military spending.

At the same time, the trend in the Nation's fiscal situation is not nearly so favorable. Without entering the looming debate on the credibility of the economic assumptions underlying the Administration's proposed budget, the weight of criticism is reason enough, it appears to be, to at least be concerned that the prospective deficit in fiscal 1990 has been underestimated.

Moreover, taking a longer view of that part of the budget with which I am most familiar, the defense part, I am persuaded that the implicit cost growth in our defense program has been underestimated, something which is a generic problem in our defense planning.

I understand that other areas of Federal expenditures might also incorporate underestimates. All-told, these factors suggest that so long as the administration, the Congress, and most Americans remain opposed to revenue increases, it is necessary to reduce Federal expenditures below the levels envisioned in President Bush's fiscal plan.

And, as demonstrated repeatedly during the past few years, it is essential for building a political consensus, that defense play a role in any such reductions.

Moreover, given the permissive international environment which I have described, it is possible, I believe, to make modest cuts in defense without jeopardizing the Nation's security.

In other words, within relatively modest boundaries, the aggregate size of the defense budget can be determined by the Nation's fiscal needs, with specific programs adjusted to fit within that budgetary total.

Illustratively, this budgetary flexibility might be considered to range between zero nominal growth and the 2 percent real growth proposed by President Reagan, a range of roughly $15 billion, of which President Bush has already suggested reducing defense by $6 billion.

Chairman SASSER. Now Mr. Blechman, you said zero nominal growth, is that correct?

Mr. BLECHMAN. That is correct.

Chairman SASSER. All right. Zero nominal growth and what was the upward range suggested?

Mr. BLECHMAN. The proposal by President Reagan for 2 percent real——

Chairman SASSER. Percent real growth. And you say the difference is $15 billion. Thank you.

Mr. BLECHMAN. That is correct.

Where might these savings come from? I believe it is essential to divide the problem into near-term reductions aiming at cuts in outlays in 1990 and 1991, and modifications aimed at longer-term sources of growth in the defense proposal.

If the focus is on reducing outlays in 1990 and 1991, cutbacks inevitably must concentrate on manpower and on operations. In proposing means of implementing the aggregate reductions proposed by the Bush administration from the Reagan program, for example, I understand that the military services are already suggesting cutbacks in the pace of programs—maintenance schedules, training hours—that contribute to operational readiness.

According to news reports, cuts in O & M budgets might account for as much as one-third to 40 percent of what the services are proposing as means of implementing the Bush cutbacks.

These of course are the easiest things to reduce within the defense budget, and if they do not persist for too long, the impact can perhaps be relatively minor.

There is a second relatively quick way to cut outlays, which is to reduce personnel. Unfortunately, such reductions are usually expressed in terms of cutbacks in combatant forces, and while some such reductions may be desirable, my preference would be to take cuts in civilian and military personnel assigned to supporting units and installations.

This is a more difficult task as it requires a thorough review of the huge defense bureaucracy as well as manpower planning factors, but I believe that such a thorough overhaul of the defense infrastructure is long overdue.

Congress might encourage such a review by mandating reductions in the aggregate number of civilian and military personnel while freezing combatant forces, other than specific agreed changes.

And of course the level of contractive services also would have to be controlled to actually realize savings from those personnel cutbacks.

Turning to longer-term sources of reductions in defense requirements, I begin by pointing out that defense will account for roughly 5.4 percent of GNP in fiscal 1990, and maybe 25 percent of Federal outlays.

These proportions are not excessive in any absolute sense. We have spent far more, relatively speaking, in peace-time as well as in war-time. The question is not whether we can afford the current defense program; it is a matter of choice. The country apparently prefers to avoid higher taxes and to protect entitlement programs, rather than to fulfill the defense build-up initiated by the Reagan Administration.

Assuming that these priorities continue to hold, it is essential to adjust the basic factors which drive the defense budget so that they conform to fiscal realities.

Far worse than an efficiently planned but smaller defense posture, in my view, is a defense posture based on unrealistic assumptions which cannot be fulfilled.

To reduce defense demands over the long-term, I think one should again look at the supporting infrastructure, and attempt a more far-reaching and intensive version of the review I just mentioned.

Just as the more successful American corporations have streamlined their operations and reduced their costs to conform to the economic environment of the 1980's, it is time to reconsider the fundamentals of defense planning in a serious way.

Both the Department's physical infrastructure and its bureaucratic organization should be subjected to a tough-minded review, and the basis of manpower planning and use should be similarly reconsidered.

In the area of weapons acquisition we already know what to do. The reforms proposed by the Packard Commission, which Mr. Woolsey served on, need to receive attention in fact, and in deed, as well as in rhetoric.

Secondly, we need to reconsider current plans for expanding offensive strategic capabilities and for developing defensive systems at the same time.

Hopefully it will prove possible to reach a START agreement within the next year or so, which will reduce strategic costs somewhat, but even in the absence of such a treaty, I believe it is desirable to curb the planned growth in strategic problems.

Congressman Les Aspin recently suggested alternative ways of phasing strategic programs so that their aggregate budgetary demands do not exceed current levels. While I might debate the size of the strategic budget which he suggested, I believe that the approach has considerable merit.

The uncertain relationship between defense budgets and the Nation's security is no more apparent than with regard to nuclear forces.

Thirdly, we need to review the objectives and missions of the U.S. Navy. The 600-ship Navy unfortunately became a political slogan of some weight during the past 10 years, but now that both the Reagan and Bush administrations have relegated that objective to some indefinite distant time, perhaps the more fundamental questions of what we expect the Navy to accomplish, and how we hope it will go about those tasks could be considered with greater reason.

I really do not know what the results of such a review might be for the Navy's budget. After a similar review, the Carter administration planned for a smaller and less costly Navy, but that was many years ago. Naval planning needs to be rationalized, regardless of its budgetary implications.

Finally, there are questions of the necessary size and composition of our ground forces and land-based tactical air forces, questions determined primarily by requirements for these forces on the central front in Europe.

I oppose unilateral reductions in U.S. forces in Europe, but I believe that the new talks which just opened in Vienna offer a tremendous opportunity not only to reduce the burden of defense but to achieve important U.S. political objectives in Western and Eastern Europe, and to preserve the NATO alliance for the indefinite future.

If we assume that the forces removed from Europe were phased out of the force structure, and that appropriate cuts were made in the defense infrastructure, an agreement that made possible, for example, a 50-percent cut in U.S. ground forces in Europe, could save—according to a quick calculation I made—some $13 billion per year, once fully implemented.

To conclude, perhaps the greatest hindrance to effective defense planning in recent years has been the repeated swings in the budgetary resources made available to the Department.

More important than the absolute level of the defense budget, in my view, is some predictability about what that level is going to be.

It is essential the administration and the Congress quickly reach agreement on the aggregate size of the resources to be made available to defense, say, over the next 5 years, and to stick as closely to those commitments as possible.

Moreover, procedural changes, such as the adoption of a biennial budget, and a longer-term focus for the defense legislative committees, could facilitate budgetary stability.

I believe that the Congress' approach to defense planning, as well as the administration's, needs some reform.

Thank you, Mr. Chairman.

Chairman SASSER. Thank you, Mr. Blechman.

Mr. Adams, Senator Exon wishes to ask some questions and he has got to be at a hearing here in just a few moments beginning on the new Secretary of Defense designate. So, we might turn to Senator Exon now for his questions, and then return Mr. Adams for his statement.

Senator EXON. Mr. Chairman and members of the panel, thank you very much for your courtesy. I will just take 5 minutes and then move on. Thank you for coming here with your expert testimony that we need as we address this critical problem.

You each have mentioned our nuclear deterrent and I am intricately involved in that, and a part of that is that we should be recognizing that the squeeze is really on money-wise. And when you talk about force reductions and those kinds of things, what you need to do probably will be necessary, and when you look at what I face in my Strategic Subcommittee, with somewhere around $200 billion in the next few years, or more, to clean up our nuclear waste at our present defense plants and facilities, and then tie in with that or on top of that the need for the new tritium production facilities, it is a nightmare from a financial standpoint.

I know, and you experts know, too, how important tritium is, and you also know, it is public information, that we have no tritium production now. That situation is likely to get worse before it gets better.

I was quite shocked and surprised this morning when we had key and top witnesses from the Defense Department before us and they enthusiastically backed what the administration announced last year, with a dual approach to producing tritium, building and constructing a new heavy-water plant that we should have started on years ago in South Carolina, and then the dual track of also going ahead with the multifacilities in the State of Idaho, incorporating the new gas, a yet untested procedure, but it needs to be worked on.

I guess what I am trying to say is I do not believe we are really facing four-square the problems that we have. Would you not agree, as experts in this area, that as critical as tritium is, and obviously the fact that even if we can get the South Carolina facilities back on track producing some tritium, that we have got to go on some kind of a crash program, an expensive one, to get a new heavy-water on line as quickly as possible, since we know that process will work, it does not require a lot of R&D, we had better go ahead.

Would you not think it would be wise, under the circumstances of the budget crunch, what we are facing in this area, for us to maybe concentrate exclusively, at least for the next 2 or 3 years, on getting the heavy-water plant going and funded and planned in South Carolina?

Mr. **Woolsey**. Senator Exon, this is not a subject which I have studied carefully, so I have only the impressions I gleaned from reading the press on it and a few casual conversations with friends.

I believe that, whether one chooses to go with the heavy-water plant or some rather more innovative and new approach toward tritium production, it is important to try to get production started up relatively soon, otherwise we are going to end up I think, per force, disarming ourselves with respect to a major share of our strategic forces. So, we can deal with this situation for a short period of time, but we cannot deal with it for a long period of time.

The international situation is still sufficiently uncertain, in spite of some recent fascinating and hopefully very promising developments in Eastern Europe and the Soviet Union, that I think we are going to be relying on an offensive deterrent for a very long time, and it is one of those things, one of those very few things about which I think the country has to be absolutely certain. And I think being able to continue to modernize our strategic forces within the limits of what is needed, in order to make them stable and survivable, is going to require tritium production, but I have not made a study of exactly when it has to get started or the precise methods.

Senator **Exon**. Thank you, Mr. Woolsey.

Do the other members of the panel care to comment on this?

Mr. **Blechman**. I agree that it is essential to maintain our capabilities to produce offensive nuclear forces and to modernize them, but the question is one of scale and degree, and it is difficult from public information to comment on specific plans, because the detailed rationalization for the proposals are not made public, as you know.

My impression, however, is that the plans for our production facilities are predicated in part on plans established during the initial Reagan term which foresaw much greater expansion of nuclear capabilities and a much more rapid rate of modernization than is either necessary or desirable. It is important for people with access to the detailed information to review production facilities plans in conjunction with a more realistic assessment of what is going to happen to the nuclear inventory and modernization programs over time.

Senator **Exon**. Thank you.

Mr. Adams?

Mr. **Adams**. Senator, having not said anything yet, let me just add, as a budgetary matter, that if it is considered important to undertake one or two new steps in tritium production, that budget is not exempt from the zero sum gain quality that it now has.

Defense, I will argue later, is not exempt from that zero sum quality, which means that a new reactor program or two, being exceedingly expensive, the clean-up being expensive, and our strategic modernization plans being expensive, trade-offs will have to be made, priorities will need to be set, and people with more access to the technical information than I have will have to recognize that a decision to proceed with tritium reactors and a clean-up has implications for strategic modernization plans in general. They cannot all be had at once.

Senator EXON. Thank you very much. I have one last questions, if I might, and you could give me as short an answer as possible, gentlemen, and I again thank you for giving me consideration.

Last year, the Secretary of Defense, Frank Carlucci, made quite a presentation here in the Budget Committee about his concern of the eroding industrial base in the United States to support our national security. As briefly as you can, do you think that is a problem and, if so, is it getting better in the last 12 months?

Mr. WOOLSEY. I think, Senator Exon, it is an extraordinarily serious problem and it is steadily getting worse. I would point out, for example, that the Department of Defense has very little visibility, even from within the Department, on the industrial base at the subcontractor level and component supplier level. For many of the items that we are concerned about—some of the better known ones—are certain types of computer chips and processors and so forth that have gotten some publicity—it is not simply a question of retaining an adequate number of airframe producers—we probably have more of those than we really need right now—it is a question of having an adequate number of suppliers of all sorts of components and subcomponents. In many of those areas the industrial base of the United States, has I think, been eroded badly, for a whole series of reasons which are not really principally the fault, in most cases I think, of the Department of Defense. But it means that we have to pay a lot more attention than we have in the past to the industrial base, and we need to manage that problem much better than it has been done to date in the Defense Department.

Mr. BLECHMAN. I agree. It is a very serious problem and getting worse. I would highlight one aspect of it, which has not received as much attention, which is a trend toward increased foreign investment and acquisitions of—not defense contractors so much—as defense-related companies, companies that produce high-technology components that defense manufacturers use.

There has been a sharp trend toward foreign acquisitions of these companies, particularly those with a net worth on the order of $50 to $100 million. These foreign interests are paying premiums, much more than American investors will pay, in order to gain access to the technologies they possess. It is a very serious problem, I think, which is not being addressed.

Senator EXON. Mr. Blechman, are you familiar with the so-called Exon-Florio amendment to the Trade Act of last year that is directed at that?

Mr. BLECHMAN. Yes, I certainly am, and that amendment provides the executive branch with the authority it needs to deal with the situation. But at least in the last administration, there was an ideological opposition to any intervention in these matters. Perhaps that will change with the new Defense Department and DOE officials.

Senator EXON. I hope so.

Mr. ADAMS. Let me just add one point, Senator. Both the Office of Technology Assessment and the Defense Science Board studies on the industrial base have indicated that the problem is serious and is growing worse and they provide an incredible amount of very rich data for the analysis of the problem.

The OTA study focuses more attention than the Science Board study on the fact that the problems with the industrial base, which are at the level of the suppliers and components manufacturers, go beyond the defense sector. They are not independent of the problems of the defense sector, but involve the general problem in industries that are suppliers and manufacturers of components or are in the high-technology sector.

So, it strikes me that, if we are going to deal with the industrial base, the appropriate question the Congress is going to have to grapple with, over the next few years is where is the appropriate locus of responsibility for what the Federal Government does with respect to its intervention in the industrial base, not just in defense, but more broadly as well.

Mr. **Woolsey**. Senator Exon, may I add one point? To give you an illustration of a country that does it very differently than we do, one might look to one particular aspect of the Japanese management of their economy. Japan has an entire tank production industry. It produces 20 tanks per year. There is some talk that it might go up to 50 tanks per year. Japan has one armored division, but it has a tank producing industry. Now, that is a lot of overhead, but that is looking after your industrial base.

Senator **Exon**. Gentlemen, thank you very much for your courtesy, and I appreciate very much the consideration of the Chairman. Thank you, Mr. Chairman.

Chairman **Sasser**. Thank you, Senator Exon.

Mr. Adams?

STATEMENT OF GORDON ADAMS, DIRECTOR, DEFENSE BUDGET PROJECT, CENTER FOR BUDGET AND POLICY PRIORITIES

Mr. **Adams**. Thank you, Senator.

It is a pleasure to appear before the committee this afternoon. Let me go briefly over some of the points that I have to make, since there are many respects in which I share the views of the two witnesses who have preceded me.

Let me start by asking whether the budget plan for national defense presented by the administration is good enough, or whether more will have to be done. I would suggest that, in two respects, Congress is going to have to go below the levels proposed by the administration.

First, it is somewhat unrealistic, given the concern that Congress has about deficit reduction and the relatively minimal contribution that the administration's plan makes to deficit reduction; or, to put it another way, given the relatively unbalanced contributions to the deficit reduction between defense and domestic programs.

Secondly, the plan is unrealistic in the sense that the out-year assumptions of growth (1 percent real in the 2 years after 1990, and 2 percent real in the 2 years after that) are extremely unlikely, especially if Congress changes the top line for 1989. They are unrealistic projections in that they provide an opening for the Defense Department to avoid tough choices and the planning that they need to do, because DoD can assume it will "get well" in the out-years.

Some significant cuts have already been made from prior years, from the Reagan-Weinberger assumptions or a couple of years ago, to George Bush's budget; probably down $300 billion over the 5-year plan. But the problem is not going to be simple for the Congress. From the Bush administration's submission to a 5-year, no real growth budget plan, would require finding another $42.5 billion worth of budget authority. From the administration's submission to no nominal growth would require finding another $175 billion of budget authority. So the exercise is not going to be easy.

Let me briefly summarize what I have to say by noting first that we have come a long way in defense. This is a point we sometimes miss. We often deal with defense as a year-by-year exercise and don't look back and recognize that several things have happened over the past 8 years both to the funding and to the quality of the Nation's defenses.

First, we have doubled the defense budget base. We are not, in any sector of the Congress or the executive branch, talking about going back to a $140 billion defense budget. We have doubled it in current dollars, we have increased it 40 percent since the beginning of the decade. We are now planning for defense at a whole new plateau. It is important to recognize that change in looking at what can be done now.

Second, the people that we have in the military include a higher ratio of high school graduates, who are retained at a higher rate and are better trained.

Third, the force structure has increased in size. While the Air Force and the Army have not particularly grown on the active duty side, the Navy has added nearly 90 ships over the decade, and there has been large growth of about 30 percent in the Reserves for the three services. So, we have added to the size of the force structure.

Fourth, we have increased our readiness and our sustainability—the numbers for training rates, exercises, mission capable rates, ammunition supplies, spares supplies have all improved over the decade, though they have begun to flatten since about 1986–87. There are now some problems with flat rates, backlogs in depot maintenance, funding cuts in ammunition, that constitute warning signals, but not yet major problems.

Fifth, the modernization program of the 1980's has added significantly to the capabilities of the military. The equipment is more modern and more capable, despite the problems we have sometimes had with certain systems. It is also important to note that, as we add equipment, we also are adding significantly to cost. Comparing the prior 7 years with the first 7 years of the Reagan-Weinberger stewardship in defense, we bought 5 percent more fixed-wing aircraft, but spent 56 percent more for them in constant dollars. We bought 9 percent more tanks but paid 104 percent more in terms of cost. We decreased missile production——

Chairman **Sasser**. Would you repeat that, Mr. Adams?

Mr. **Adams**. Yes; I will. These are from the Congressional Budget Office study of last year, Senator.

Chairman **Sasser**. All right.

Mr. **Adams**. We bought 5 percent more fixed-wing aircraft in the first 7 years under Reagan-Weinberger than in the prior 7 years. It cost us 56 percent more to do so in constant dollars.

Chairman **Sasser**. In constant dollars?

Mr. **Adams**. In constant dollars, after inflation.

Chairman **Sasser**. Why?

Mr. **Adams**. Largely because of the sophistication of the equipment. They are more expensive and sophisticated missiles, aircraft, ships, tanks, armored personnel carriers, each of them costs more than the prior generation.

We bought 9 percent more tanks, but went up 104 percent in cost. We actually bought 24 percent fewer air and ground-launch-launched tactical missiles in the seven years, though it cost us 107 percent more.

Chairman **Sasser**. Let me take you back to the tanks. Will you repeat that?

Mr. **Adams**. Yes, we bought 9 percent more tanks, comparing the first 7 years of the Reagan-Weinberger stewardship to the preceding 7 years.

Chairman **Sasser**. All right.

Mr. **Adams**. Those tanks cost us 104 percent more.

Chairman **Sasser**. Well, is an M–1 tank 100 percent better?

Mr. **Adams**. Some would argue that it is. It is a technically more sophisticated piece of equipment. It has more fire power, it has better communications, it rolls faster, et cetera.

Chairman **Sasser**. I know all of that. I mean if it is going to cost 100 percent more, it ought to do all of that.

Mr. **Adams**. That is right. Our problem, Senator, that as we buy better equipment, we aren't able to buy as much of it.

Chairman **Sasser**. Well, what happened to the old concept that we followed in World War II, let's just grind a lot of it out and overcome the numbers? You know, we knew the Sherman tank would not stand up to the German Tiger tank, but we just thought we would overcome them with numbers, and that is precisely what we did.

Mr. **Adams**. That is right. We have had over the past 20 or 30 years a fixation with moving rapidly to the next generation, rather than punching out an existing stock of equipment. It is a rather different process for the production of equipment than they have had in the Soviet Union.

Chairman **Sasser**. I think it may be starting to work. I think the Soviets are realizing that they are bankrupting themselves trying to keep up with the level of sophistication that we are building into our weaponry. Go ahead, I did not mean to interrupt you.

Mr. **Adams**. That is quite all right.

For all of these accomplishments in force structure and funding, we have also had some real security gains in the 1980's, and those have to be acknowledged, as well. There have been significant changes, mentioned before, in Soviet policy that enhance our security. NATO is a strong force, in some sense stronger with the INF decision. Conflict resolution is taking place in the Third World, in ways that we had not anticipated at the beginning of the decade.

We have had both military gains and real security gains, but we are now at two crucial junctures: One of them is fiscal. This committee focuses on the fiscal issue especially. Defense has always been planned both with respect to the threat and to available resources, especially in peacetime. We have never been in a position where we could fund all of the requirements that the Joint Chiefs of Staff saw as necessary for the Nation's security. We have always had to weigh those requirements against the availability of the resources to do it.

We have a particular problem today that stems from the nature of the build-up under the prior administration, a build-up that was oriented towards military hardware, whose share of the defense budget increased dramatically over the decade. Because of slow spend-out rates, that increase in hardware spending, has left us with a large backlog that will keep defense spending levels high and increase the operations and support costs for the equipment that will follow.

The 92-percent real growth rate in research and development spending over the same decase has led us to immediate decisions that now need to be made with respect to new military hardware programs, the so-called "bow-wave" programs. These include strategic programs and conventional programs too numerous to mention, all of which have production decisions that have either just been made or will be made in the next year or two.

I do not envy, for example, the situation that the Air Force finds itself in, with aB-1 program, with aB-2 program, C-17 and F-15 and F-16 and F-117, and some decision in the next year on a new close air-support aircraft. Stuffing all six lanes of that hardware into the four lanes of acquisition budget the Air Force will have is going to be an extremely difficult management exercise.

The defense budget management problem which that typifies is made more difficult because of the Federal deficit. It puts a lid on our ability to plan in an open-ended way with respect to defense resources. To return to my opening point, this means that the 5-year plan currently presented by the administration is unrealistic, but it opens the way to some bad planning.

There are two ways to deal with this dilemma. One of them is to seek quick-fixes. Are there some strategies that we could use to get easy funds that would bring defense down to the levels of realistic budgeting?

Let me suggest five or six of those in passing, and note the problem that each one poses. We could stretch out hardware programs, something we have done that systematically since 1983-84. The current budget scrub as Barry Blachman has suggested, opens the risk of even more stretch-outs than those already proposed in the last budget submitted by the Reagan administration. There are more such stretch-outs coming. Stretch-outs, unfortunately, at the inefficient rates we are now producing equipment, give us fewer and fewer dollars to apply to new defense requirements. They are less and less capable of generating money.

Second, we could find a new slogan like competitive strategies, which might produce some choice-making, help us buy the things that give us advantage over the Soviets, and not buy things which do not give us a comparative advantage. The risk with a slogan of that kind is that it is interpreted to cover the entire defense budget and does not guide choices.

Third, burden sharing, or getting the allies to pay the difference between what we want to spend and what we are capable of spending. There are many who question the validity of the proposition that the allies are getting a free ride, But, even if the allies are getting a free ride, it is unrealistic to argue that we will get increases in expenditure from them of the kind that would replace cuts that we need to make. The act of seeking such spending would, I would argue, pose grave risks to our political relations with many of our allies. So, burden-sharing is not an easy solution.

Fourth, arms control, the substance of which I will return to. Historically, of course, arms control has not generated big budgetary savings. In fact, we have spent a good deal on systems we were able to build in the framework of arms control agreements, in part as a way to achieve ratification of those agreements.

It is entirely possible that the START package now emerging would allow us to continue the modernization programs we now have on line, while, at the same time, conforming to the terms of the agreement. This means START may not save us resources. Conventional arms control might do so, but, as I will argue in a moment, would do so over a longer term.

A fifth quick-fix is base closings. I am not going to say much about it, given the small and now disputed savings that may result from the closings proposed by the Base Closings Commission.

Sixth, waste, fraud and abuse. Is there a way to manage the Department better, so that we achieve savings? There is no doubt, as Jim Woolsey, who participated in the Packard Commission's work, knows that there are savings to be had here. Unfortunately, waste fraud and abuse is not a line item; it is not something that is easy to strike out of the defense budget. It will take a lot of tough management attention before you find those savings, and, I would argue, until you make program decisions, eliminating waste may not result in large savings.

That leaves us looking at the long term. Like a "deus ex machina," there may be changes arriving on the international scene that open the possibility for us to find longer-term defense savings. In fact, I would argue that we may be looking at the first major opportunity to seriously rethink the force structure of the U.S. military that we have encountered in 40 years.

What are the new threats? What are the changes? I will just touch on them, because they have been already mentioned. Soviet strategic and conventional force policy changes open the possibility for a cautious, careful review of what may be negotiable, both with respect to limitations on modernization of strategic forces and with respect to real reductions of conventional forces in Europe, foreshadowed by the unilateral reductions being done on the other side and the openness in Soviet and Warsaw Pact negotiating positions, to asymmetrical reductions and intrusive inspection.

Second, conflict resolution in the Third World, as I mentioned, may well change the nature and direction the requirement for power projection forces.

Third, the loss of U.S. bases over time will have an effect on how we look at the future of the force structure.

Fourth, new threats such as terrorism and drug trafficking, will face the military forces of the United States.

And fifth, national security considerations are increasingly dominated by economic issues to which we must devote careful attention. The United States status as a debtor nation, our yawning trade deficit, problems with competitiveness in domestic United States industry, the competition that we face from the Japanese and from European nations with the arrival of the internal market in 1992, Third World debt problems, all loom as major economic determinants of American national security in the 1990's. We are going to have to devote resources and attention to them.

In sum, this means rethinking U.S. forces and missions in the framework of new goals carefully redefined for the long term, and as a way of gaining long-term budgetary control in defense. What I am suggesting, Senator, is that we don't need a Stillman diet approach to the defense budget, but a Weight Watchers approach. We should not seek rapid funding savings and weight loss in the first year or even the first 2 years, but should engage in careful planning that will get weight down and keep it down, with a capable military force as a result.

In the short-term, this means, first, taking a careful look at the hardware new starts that are currently pending in the defense budget, and making tough choices among them for long-term budget control. This means buying the current generation of military hardware efficiently, instead of inefficiently, and modernizing carefully. That has particular impact on strategic hardware decisions, where budget growth has been more rapid in in the past decade and where it would be rapid and real in the early years of the next decade, if we proceed with all the programs currently projected. Here, the Congress faces serious choicemaking points with respect to ICBM's, bombers, and strategic defense.

The examination of strategic choices goes beyond the concept of a pool, as suggested by Congressman Aspin, which does not count some of our strategic spending. The budget requirements may force us to go deeper in setting priorities among those programs than the Congressman has proposed.

Second, we need to maintain high readiness and sustainability levels. Third, leading to the long term we need a careful review of force structure: how large should the Navy be and what should its missions be, how many active versus Reserve divisions do we require? Here the American Agenda proposals of moving some divisions to Reserve status are worth considering. How many air wings does our security require? All of this needs to be done within the framework of a careful policy review. There is, I would add, some serious thinking on these issues now taking place within the services.

Chairman **Sasser**. Mr. Adams, are you getting close to the end here, because——

Mr. **Adams**. I am almost done.

Chairman **Sasser** [continuing]. Have got a time problem that is unavoidable. I have got to go to the White House here at about 2:40, and I have got to met with the majority leader in 10 minutes and I want to ask you some questions.

Mr. **Adams**. Absolutely. One final sentence, Senator, and the floor is certainly yours. The advantages we gain from this longer-term approach would be greater efficiency in current modernization, an end to the practice of cannibalizing the force structure to find resources, long-term fiscal control in defense, a leaner and meaner defense, and a reorientation of the force structure to fit 21st century missions.

Thank you.

Chairman SASSER. Gentlemen, thank you very much, and I apologize for the attendance today. I think all of my colleagues are involved in a whole series of committee meetings this afternoon.

I want to ask you some questions, and I will ask you, if you will, to keep your answers as brief and succinct as possible. I know this is a very complex subject and it is not easy to answer in a short fashion, and if you wish to amplify later, you may for the record.

But let us everybody make a list here and put on that list MX, rail, mobile; B-1; SDI; Midgetman; Trident; and B-2. Now, Mr. Woolsey, I want you to look at that list and, if you will, rank those one through six in priority, and I would like to get Mr. Blechman and Mr. Adams to do likewise and then have you tell us what your list reads like when you have had a moment to consider it there.

Mr. WOOLSEY. All right.

Chairman SASSER. All right. Are you ready?

Mr. WOOLSEY. One, Trident; two, Midgetman; three, B-1; four, B-2; five, SDI; six, MX, rail, garrison.

Chairman SASSER. All right. What do you say, Mr. Blechman?

Mr. BLECHMAN. I say, one, Trident; two, B-2; three, Midgetman; four, B-1; five, MX, rail; and, six, SDI.

Chairman SASSER. How about you, Mr. Adams?

Mr. ADAMS. Trident, one; B-1, two; Midgetman, three; SDI, four; B-2, five; MX, rail, garrison, six.

Chairman SASSER. Why do you put the B-2 as number two, Mr. Blechman?

Mr. BLECHMAN. My preferred strategic posture would depend, essentially, on two legs, on the submarine-launched missiles and on bombers. Given the problems of the B-1 and likely developments in Soviet air defense capabilities, I believe that we should stress developing and deploying the B-2 in as rapid a way as is efficient.

Chairman SASSER. All right. Mr. Woolsey, you made an excellent contribution to the American Agenda, and you suggested one means of gaining out-year savings is greater reliance on the reserves.

This morning, I also asked Admiral Crowe about an article that John Lehmann had written in which Lehmann is now advocating that we put a very substantial portion of our active forces in the reserves, split the Air Force wings 50-50, I think maybe split the Marine divisions 50-50, and maybe the Army divisions 50-50, if I am not mistaken, as between active and reserve.

Can we really rely on reserves to ensure a consistent and constant capability? Let me tell you why I am asking this question. Now, we had the experience in the Second World War when we reactivated National Guard divisions and had to replace all of the officers and noncommissioned officers, as I recall, because they just weren't up to the job. They had to be trained, et cetera.

The Korean war comes along and you have got Marine Corps reserve units learning to fire their weapons just before making the

Inchon landing. We did not, as I recall, activate to any extent any reserve units in Vietnam.

But my point is that reserve capability appears to me to be very uneven. In some reserve units, as either you or Mr. Blechman indicated, you get a terrific, I think, buy for your dollar. This usually is in activities surrounding aircraft.

But with regard to ground units, I have some real questions about whether or not these Army Reserve units, National Guard units, or even Marine Corps Reserve units that have active regular cadres as opposed to reserve or National Guard cadres can be utilized as quickly as we might wish to do so.

Do you want to react to that question?

Mr. WOOLSEY. Yes, Mr. Chairman. It is an excellent question. I think the short answer is, no, we cannot rely on the Guard and Reserves to the degree that we would need to if we adopted former Secretary Lehmann's suggestions, unless we significantly restructure them.

I think you are absolutely right. The readiness and ability of the Reserve and Guard forces is very mixed. They go from superb to dismal in range, and I believe the principal problem is with the ground force units, and particularly the ground force units of the Guard. Most students of American military history are familiar with the very important problems you pointed out with respect to World War II and Korea.

I think it is clear what is possible if you look at the Marine Reserves, which, in my experience in the 3 years I was Under Secretary of the Navy, operate very well, at the German Territorials, at the British Reserves, certainly at the Israelis, at the Swiss, at the Swedes. There are a number of reserve forces around the world, including some superb armies, that are almost entirely reserves, such as the Israeli.

It is a question of how you structure it, and I think you have to structure it with active cadres of officers and noncommissioned officers in command and having significant periods of annual training for those enlisted people who are going to move through the structure, probably longer than the 2 weeks we now have.

We have to do the training differently than it is done now. There are a lot of things that need to be changed. I would only submit that if we are faced with significant budgetary problems in the defense arena, the least bad solution is to restructure our Reserves and Guard in such a way as to make more of them more usable sooner and to make significant demands on them in terms of training and readiness, to use that saved money both to reduce the deficit and contribute to civilian programs, and also to bring about an expansion of our R&D base, our industrial base, to do adequate prototyping and all of the types of things that are now, I think, not being done in the Department of Defense in the R&D arena.

It is not as if there are no risks, but in a rather different world, if things continue this way with respect to the Soviet Union, the Third World and all the rest of it, I would suggest that we might be able to move to a rather heavier reliance on the reserves and to give up some share of current readiness, not across the board, not giving up readiness in active forces, but planned reductions of readiness in specific units by putting them into the reserve forces.

I might add this is one of those ideas of Mr. Lehmann's, and I reviewed his book for the Naval Institute proceedings, with which I am rather in agreement. Some of his other ideas, I am not.

Chairman SASSER. Mr. Blechman, you indicated that if we went from 2-percent real growth to zero percent nominal growth, which would be, what, about a 5-percent cut in real terms?

Mr. BLECHMAN. Closer to 6 percent, I think.

Chairman SASSER. A 5- or 6-percent cut in real terms. Where would those cuts, in your judgment, come? Would they come in—they would have to be made, you say, in the short term in manpower, is that correct?

Mr. BLECHMAN. That is correct, manpower and operational accounts.

Chairman SASSER. That would really be in the readiness aspect, right?

Mr. BLECHMAN. That is correct. It is almost inevitable to gain that size reductions in the coming fiscal year that you look at those accounts. The lag between letting contracts and actually spending the funds in the procurement accounts is so great that those savings only come in on a longer time schedule.

Chairman SASSER. Well, just as a theoretical question, if we should opt to move down to zero nominal growth, what impact would that have on our capability to defend our vital interests, and how would those cuts, in your view, be reflected in the overall force?

Mr. BLECHMAN. I should say that it is not my preference to go that far in defense. My preference is to increase revenues. The weight of my testimony is only that if it is not possible to increase revenues, then one can consider reductions of this magnitude without jeopardizing the Nation's security too greatly.

Of course, it would depend on how exactly the cuts were made. Some of them could come from the procurement accounts. I think we can safely cut the SDI budget by $2 to $3 billion, saving at least a half billion dollars in outlays and perhaps as much as $1 billion that way.

There are other strategic programs and some other tactical or conventional acquisition programs which could be reduced and garner some outlay reductions as well. So if we were talking about, say, taking half of the overall reduction from the manpower and operational area—meaning half of the $15 billion cut from the Reagan budget—you are talking about an $8 billion cut in personnel and operational accounts. I think a reduction of that magnitude can be apportioned without doing serious damage.

Chairman SASSER. And you are talking about taking that, first, out of civilian employees and military logistical personnel?

Mr. BLECHMAN. That would be my preference for most of it. Now, it may be possible to make some cuts in combatant forces. It has been proposed, for example, that the Navy be reduced by two carrier task groups, that two of the older carriers be retired a few years early as means of garnering near-term savings. I think that is probably a good idea. But the remainder of the manpower and operational savings could come, I think, from the infrastructure and support establishment.

Chairman **Sasser**. Well, Mr. Woolsey suggested that we could make savings by operating the carrier battle groups closer to home port and putting the submarines out as the first line of defense.

Mr. Woolsey, how much would we save if we just dismantled some of the battleship groups? How many battleships do we have active now, three?

Mr. **Woolsey**. Three, coming on four.

Chairman **Sasser**. Four.

Mr. **Woolsey**. I think we will have four rather soon, Mr. Chairman. I think that dismantling the groups or mothballing the ships that have only very recently been refurbished is probably not the best way to save money.

I think the best thing to do with respect to the active Navy is to look toward putting into reserve status those ships that one would only be likely to really need in an all-out, general war with the Soviet Union.

And I am thinking, for example, of a higher proportion of the frigates, the FFG–7's and 1052 class frigates, a greater share of the amphibious ships that are now that way, and all of the minesweepers, mine countermeasure ships, and the like.

The carriers themselves would be among the last things, or the battleships themselves would be among the last things that I would mothball. I might operate them more slowly, and maybe in the case of the carriers put some reserve squadrons on them. We have one operating that way now—I mean, wing. We might put use more than one reserve wing for the carriers.

But I think, as I said, the ability to use land-based air overseas is going to be so restricted in the future. I think to establish air superiority in any kind of a building crisis, you are going to have to have naval aviation.

So I think you want to keep the bedrock of that, which is the carriers, and battleships to accompany them in certain circumstances, relatively ready for use.

Chairman **Sasser**. Gentlemen, there was some question about what is happening to our underlying defense industrial base. What is the thought about sharing the FSX with the Japanese? Is that going to further undermine our defense industrial base, or are we dealing in an area there in which we have got plenty of excess capacity?

Who wants to take a crack at that?

Mr. **Woolsey**. Well, Mr. Chairman, I haven't made a careful study of this any more than I have of Senator Exon's question about the tritium.

Chairman **Sasser**. Well, just feel free to speak as an expert here. [Laughter.]

Mr. **Woolsey**. I suppose Washington lawyers rush in where wise people fear to go.

I think that if one is particularly careful with regard to some of the software that has been designed for the avionics in the system, it is important for us to work closely with Japan, and it is, I think, a reasonable thing for us to have an agreement of this type with them.

I do think that it is in the United States' interest to encourage the Japanese as much as possible to use their increasingly significant resources to contribute to resolving the problems of Third World debt and economic aid to underdeveloped countries, and the like, rather than building up a large arms industry themselves which would require them, for purposes of spreading their overhead, to get involved in overseas sales.

Chairman SASSER. You made the point a moment ago; they seem determined to build that underlying defense industrial base. In other words, at enormous expense, they produce some of their own weaponry, keep a tank factory open to produce, what, 50 tanks a year, you said?

Mr. WOOLSEY. Twenty, right now.

Chairman SASSER. Twenty tanks a year, so it seems academic. They are going to try to make themselves militarily self-sufficient in what they perceive to be what is necessary to defend themselves.

Is that an M-1 tank they produce?

Mr. WOOLSEY. No. It is their own design. It is a question of pace and degree, Mr. Chairman. Certainly, the third largest economy in the world is going to be building some important and significant types of military capability.

But the Japanese constitution, our own role with the mutual defense treaty, the memories of World War II in Asia, and the rest, have produced some check on the Japanese commitment to building up a major arms industry.

And I frankly would not suggest that we encourage them to build it up more. I think they can and will make a very valuable contribution to mutual security of the Western democracies by focusing more on other types of international security issues, such as foreign aid, and hopefully not tied directly to purchases of Japanese goods.

I think that we ought to do everything we can to encourage that. I am not prepared to say whether or not I think the FSX agreement, as constructed right now, has adequate safeguards to lead them in the direction that I had suggested.

But I do think that if the software, particularly the most important types of the software, safeguard it, that it might well be a reasonable agreement.

Chairman SASSER. Well, I agree with you about their building up their military capability. I think there are still a lot of people around in Asia who remember the greater East Asia Coprosperity Sphere. They are not eager for it to come back.

Gentlemen, I have got a lot of questions I would like to ask, but I am going to have to retire. We have been joined by Senator Fowler and I am going to turn the hearing over to him.

Thank you very much for appearing today.

Mr. WOOLSEY. Thank you, Mr. Chairman.

Senator FOWLER [presiding]. Gentlemen, I am sorry I missed your prior testimony, but I am glad I have a chance to say hello to you. Actually, I have a couple of questions that I had promised some of my colleagues that I would ask in their absence. Let me do that and then we will see where that leads.

Recently, former Secretary of Defense Brown indicated in his testimony here that while he was Defense Secretary, he was frustratingly unsuccessful at getting the service chiefs to give a higher priority to readiness in their budgets.

Some of our defense experts have even suggested that we accept lower levels of readiness on the premise that increased readiness can be gained in shorter order than more modern weapons or force structure.

Yet, many who remember the 1970's, the so-called decade of neglect, and remember the low troop morale and even lower capability question, the priority which some have traditionally given the force structure and modernization—what they would like to know, and anybody can start it out and maybe we can discuss it a little bit, is can you—especially given our budgetary restraints, can you rank the order of priorities in a 5-year defense plan between force structure, modernization, and readiness?

Mr. **Adams**. Senator, let me take a crack at it. My preference in ranking those three considerations in planning the force structure would put readiness at the top of the list, not at the bottom of the list.

In terms of restructuring the nation's defenses over the next 10 years, in the short term you take a close look at, prioritize and perhaps cancel some of the modernization programs we have in the pipeline. As I argued in my testimony, those are an important element driving defense budgets now, and will continue to do so if we opt to do all of them.

Over the longer term, I would take a close look at force structure and at the relationship between actives and reserves in the U.S. military force structure. That, in turn, is linked to readiness. Some of the proposals that have been made recently to reduce readiness tend to confuse readiness with a smaller force structure.

Moving divisions from active duty to reserve is, indeed, a step down in terms of the readiness of those forces. But, I would argue that you should make that decision in relationship to your thinking about international contingencies. How big will the forces be? What are the opportunities in conventional arms reductions with the Soviets in Union? What will such a change permit us to do in terms of reserves and demobilization of the American land forces?

Out of that review you will get some changes in readiness, but as your force grows smaller, my preference would be to have as ready and as sustainable an active duty force structure as you can conceivably have, regardless of its size. So I would put the top priority on readiness.

Senator **Fowler**. Mr. Blechman.

Mr. **Blechman**. I believe that it is possible to make some reductions in budget categories normally considered to contribute to readiness in the short term as a means of reducing the deficit in the coming year and the following year.

Senator **Fowler**. Such as what?

Mr. **Blechman**. Excuse me?

Senator **Fowler**. What, specifically?

Mr. **Blechman**. Particularly with regard to the pace of military operations. I would not want to cut maintenance schedules, and so forth, so deeply that it affected the readiness of the forces in terms of their state of repair.

But we do fly, we do steam, we do exercise our ground forces much more than most nations' military establishments do. Given that we are not involved in a conflict at the current time and that it seems unlikely that we will be in one the near term, I think we can safely make some reductions in this area as a short-term measure.

Over the longer term, I think it is essential to look for reductions in force structure, if we are serious about reducing the burden of defense, and that the way to do that is through negotiated arms reductions that bring down the size of our adversaries' forces, particularly in Europe, along with cuts in our own.

Senator FOWLER. Mr. Woolsey.

Mr. WOOLSEY. Mr. Chairman, I would just add that I think readiness for those forces that are on active duty and, as much as one can have it, readiness for reserve forces, is extremely important because it does, as Barry and Gordon have suggested, play back into—as you suggested in your question—morale and retention and all sorts of important things.

But I do believe that some of the recent press accounts of the debate have somewhat misstated it. I am familiar particularly with an article by Edward Luttwak in the Washington Post which, in terms of its headline and lead sentences, perhaps sounds a bit more provocative than it is in terms of readiness reductions.

What it really seems to me to be advocating is a transfer of forces into reserve status. Just before you came in, that is the sort of thing that I was testifying in favor of and that Brent Scowcroft and I put into our American Agenda piece.

We have, for example, now, 12 heavy divisions in the Army. Actually, I suppose, five of them are fully active; another seven have round-out battalions or brigades from the reserves in them. We have six light Army divisions, two of them with round-out brigades, in addition to three active Marine light divisions.

And although we need a really solid capability for the country in case a crisis brews up, to be able to intervene in some corner of the world, I am not certain that we need at the current writing nine active light divisions.

We might well be able to put two or three of those, particularly some of the Army ones, into a reserve status as long as we restructure the way I suggested and have active cadres of officers and noncommissioned officers so that those units would be well led, even though it would take some time for them to become fully ready.

I would far prefer to see those types of changes being made as our budget pressures reduce the resources available to us than some of the other types of cuts that have been suggested.

So in some people's eyes, if they want as many active divisions as possible, that would be characterized as a readiness cut. I don't really think it is. I would suggest that some of the types of restructuring from active to reserve that I was talking about before would be a very valuable tool for the President and the Secretary of Defense and the Congress to look to in these austere budget times that are approaching—or that are already with us, I should say.

Senator FOWLER. Let me ask you all a couple of—since there is nobody here—we chased out the press early. Let me ask you a couple of serious but—that sound serious, but frivolous questions that go beyond the topic and certainly what we have asked you to prepare for. But if you will bear with me, you will see what I mean and maybe you will enjoy it.

Given the austere budget times that we are in, if any President of the United States called you in and said, look, I don't think we can cut any more of these domestic programs—I want to be the education President. For reasons of economic competitiveness and international competitiveness, I think we have got to clean up the oceans. I think we have waited too long in many of our infrastructure needs.

And yet I am convinced that we cannot pare back defense in all of its many aspects. In fact, because of what some of our enemies are preparing to do, we have got to add another 10 or 15 percent, let us say. That number is just arbitrary.

So what I have decided to do is to ask the Congress and the American people for a 2-percent tax, national security tax, which will go specifically to continue the modernization, readiness, and the finest armed services.

How would you react to our fictitious President? Let us bring some of you readiness experts into——

Mr. ADAMS. That is a difficult question to answer. It is a good question, because it poses the problem of priorities. Yesterday, I testified to a budget task force of the U.S. Conference of Mayors and was preceded by Alice Rivlin and Robert McIntyre. By the time I came up, I had concluded that Alice Rivlin's strategy was to pay for the poor and Bob McIntyre's was to soak the rich. And 2 guess I was there to soak the well-armed. I assumed that they were all going to be in trouble as elected mayors if they soaked the rich and soaked the well-armed at the same time. The way you are suggesting out of the dilemma is unlikely, since nobody will vote for the tax.

Senator FOWLER. Why?

Mr. ADAMS. Not just because it is another tax and there is a fairly widespread resistance to increased taxes, but also because there is a widespread public resistance to increasing defense spending right now.

If you look at the polling data, the public is prepared to keep defense where it is or cut it. Recent polling data shows a public softness about defense spending on the down side. My first piece of advice to the President before I gave him your dilemma would be to say this proposal is going to get you in some political trouble, given those public opinion polls.

Senator FOWLER. Just for the sake of discussion, suppose that—I know there are some polls like that, but do you not believe that if the President said, because of information that he had—it might be classified information.

If any President made the case to the American people that defense had to be increased as a national security matter, how would you react to earmarking a tax to pay for that increase?

Mr. BLECHMAN. I would have to agree that it would be a mistake to have an earmarked tax like that. The international circumstances are just not supportive of such an emergency measure; the President would have grave difficulty on Capital Hill and with the American people generally in justifying such a tax.

Singling out defense for a special levy like that, moreover, makes it more difficult over the long term to sustain support for whatever level of defense spending is necessary. My preference, as I have said, is to increase revenues, but I would like to see defense share in revenues garnered from a variety of sources for a variety of Federal expenditures.

Mr. WOOLSEY. Mr. Chairman, I would agree. I think that defense is a general need and it is hard to have a user fee or a trust fund arrangement for defending the country. Barry said in his initial remarks that defense is, in a sense, like paying premiums on insurance. The question is how much life insurance do you want.

It is like that to some degree, but it is a little bit different because since there is somebody on the other side whom you are attempting to influence, it is like insurance in which, if you pick the right kind of insurance, then paying the premiums reduces the risk.

It is sort of like paying insurance premiums and fastening your seat belt at the same time. So I think it is something that generally helps the country as a whole, and consequently I don't think it is like building highways or a number of other things that really are appropriate for user fee or trust fund arrangements.

We have some pretty clear cases in American history in which the public was asked, in a sense, to pay a specific tax in times of great national peril and refused to do so, or nearly refused to do so.

In September 1941, the month I was born, Sam Rayburn and a few other Members of the Congress saved the draft by one vote, and a lot of people say, "Isn't that remarkable; wasn't it prescient of them? It was 3 months before the beginning of World War II!" It wasn't, of course; it was 2 years after the beginning of World War II for the rest of the world, other than us.

Even in those circumstances—in which, in a sense, an indirect tax was proposed on American young men being drafted, which is in a lot of ways what drafting is, requiring people to pay a tax and come into the armed services for less than they would otherwise be paid on the free market—after the Battle of Britain and all the rest of it, the invasion of the Soviet Union, we still very nearly didn't extend the draft.

So I think even in times of immediate national peril, and this is, apparently, not one of them, the public acceptability of specific taxes for national security is virtually nil. So I do support, as I said in my initial remarks, increased revenues. I would prefer a tax on energy in some fashion, perhaps gasoline, perhaps oil imports, some mixture of the two. But I don't believe that earmarking that or any other kind of tax for defense is a wise national policy.

Mr. ADAMS. Senator, let me just elaborate on what I said in my testimony. I described dealing with defense planning today as either a Stillman diet or a Weight Watcher's diet. You either do something brutal in the short run and acquire a lot of resources but systematically make fulfillment of your national security needs difficult, or you send out, as I would urge the President to do, a long-term message about rethinking defense in the context of our international commitments and changes in the international scene.

If you do that, rather than institute a special tax to deal with a one-time problem, you could probably sustain a public consensus with respect to a realistic level of defense spending and quality forces over the long term. That is the course that I would urge on our President.

Senator **Fowler**. Well, we certainly don't want to do something that you kill, like the Scarsdale diet. [Laughter.]

Let me ask you one other question from my fictitious President to his real-life advisers. What if our President came in and said, look, we are finally going to get serious about drugs after all this rhetoric? If is has to be an educational effort, it has got to be a law enforcement effort, it has also got to be—I have decided I am going to use the armed forces of the United States.

What would you say are the constitutional objections to using our armed forces, and then what are the practical objections and/or practical opportunities if you would advocate that course?

Mr. **Woolsey**. Well, Mr. Chairman, growing out of some of the abuses of the use of armed forces against civilians and against, doubtless, your ancestors as well as mine in the 1860s, the Posse Comitatus Act has significantly over the years restricted the use of the armed forces of the United States in civilian law enforcement.

Former Senator Sam Ervin was a great exponent of the importance of posse comitatus, and I believe that it remains, in essence, a sound law. It, as well as the civilian traditions of the United States and the constitutional prohibitions against the use of military forces and maintenance of habeas corpus except in times of rebellion, all of that, creates a reasonable situation. One does not want, for either constitutional reasons, reasons of violating the posse comitatus law, or the general comity and favorable attitude which most Americans have, I think, toward men and women in uniform, to move toward the use of uniformed military forces for law enforcement, even in such a severe matter as drugs, except in the most extreme circumstances.

Now, having said that, I think that in the fields of intelligence and surveillance, command, control and communications, surveilling our borders, engaging drug-runner aircraft as long as it is civilian authorities that actually make the arrest, there is probably a good deal more that the uniformed military could do as long as we are willing to divert resources and actual aircraft and actual airmen and soldiers and naval officers and ships away from their other duties.

If I thought that a significant increase in activity of that type—that is, flying radar warning aircraft, operating a military command and control system, and so forth—would make a very major dent in the country's drug problem, I would be very much in favor of it.

I think I am in favor of it anyway, but my hunch is that it is not going to make a huge dent because of the ingenuity and the different ways in which drugs are smuggled into the country.

It is my understanding from people who have studied this a lot more thoroughly than I have that most drugs that come into the United States come in in containers and surreptitiously in one way or another, whether they are bored into furniture or buried in coffee, or whatever.

It is not the case in which we are normally looking for a few easily identifiable large ships or large aircraft of the sort that military systems are primarily designed to detect and intercept.

Senator **Fowler**. Let me interrupt you there. I hadn't even thought of this until you mentioned it, but one of the things that we have cut drastically—I don't have the figure in front of me—over the last 8 years is Customs personnel.

Every major airport in the country, for instance, as well as ports, have been crying that they have no chance of discovering drugs at port of entry being brought in by individuals without doubling, tripling, quadrupling the number of Customs inspectors.

So I guess what you are saying is that that could be a use if we wanted to——

Mr. **Woolsey**. Well, I think it is most short-sighted to cut Customs officials, given the drug problem that the country faces.

Senator **Fowler**. I agree with that, but the fact is we have done it. The question is whether we use Army personnel there.

Mr. **Woolsey**. Well, I still would not do it. I would try to work to get some of the cuts restored in Customs. I don't think the solution is to have men and women in the uniform of the U.S. military forces standing at airports and arresting people.

Mr. **Blechman**. I think there are important roles for the armed forces in the war against drugs. I think they can be used to assist foreign governments cooperating with us to get at the source of these drugs. They can train foreign forces, provide equipment, and serve in advisory missions.

I think in certain circumstances when foreign governments themselves are involved in the drug trade, we might want to consider military options, as in the Panama case. And I think, as Jim pointed out, the armed forces could be used to augment the surveillance capabilities of Coast Guard and Border Patrol, and other agencies to identify people violating the borders for drug-running or other purposes.

I agree with Jim that it would not be wise to use the military in place of civilian police forces in direct kinds of roles.

I would think it would be more feasible to consider a special tax to augment the various agencies which contribute to our ability to go after the drug situation. It is not only the Customs Service, but I believe the Coast Guard has been cut back as well. The Border Patrol could certainly use more resources and, for that matter, our crime-fighting agencies—from the number of prosecutors and judges to the capacities of prisons to police forces—all could use augmentation.

I am not a politician, but I would guess that a special tax earmarked for those purposes would receive a warmer welcome than one earmarked for national security.

Mr. **Adams**. I agree with Barry up to a point. I am not a fan of special taxes for each of the problems that we face as a nation, though I recognize that solution, in the framework of Gramm-Rudman-Hollings, is tempting to the Congress.

What I think he is pointing to is that the drug problem is bigger than the problem of national defense in the sense that it involves everything from street crime and prisons and the criminal justice system to areas where the military can play a role. A number of roles that have been suggested for the military in the drug situation may be appropriate.

The other thing I would say, though, is that the nature of the threats that we are facing to our security are changing very dramatically in the 1980s and 1990s. Given budgetary constraints, it is very difficult to simply add another mission to the military because——

Senator **Fowler**. Add another mission?

Mr. **Adams**. To the military.

Senator **Fowler**. Yes.

Mr. **Adams**. The resources aren't there to add missions and to add the costs of those missions. This means, as I suggested, sitting back and rethinking our missions, goals and commitments in the framework of changing international realities and in the framework of changing budget resources.

I mentioned drug trafficking in my opening remarks as an area where we need to rethink how we may use military forces, but as part of rethinking those forces overall. In other words, I think it needs to be set in the context of rethinking military missions and force structure.

Senator **Fowler**. Very interesting. You know, Mr. Woolsey, we have had several—I hate to call newspaper editorial writers responsible, but some who parade under that banner have suggested in recent days that we, the Congress, use either the Army or the National Guard. Both of those have been specifically recommended—bring them in to the streets of Washington.

I saw the headline this morning. I don't know what Mr. Bennett, the new drug czar said. I hear he said he was going to make Washington the big test case and battle ground in the war on drugs.

But I am on the—one of the penalties of freshmanitis is you have to be on the D.C. Subcommittee of Appropriations, so there are going to be those proposals. Do you have the same posse comitatus objections to the National Guard?

Mr. **Woolsey**. Well, there are circumstances in which the active duty military has been used in civilian disturbances not only in the Civil War, but during the 1960s. But I certainly don't think that that is called for in the present circumstances, Mr. Chairman.

As far as the D.C. National Guard is concerned, the nature of the National Guard is that these are regular citizens who have other jobs. They can reasonably be called upon for short-term emergencies, floods and national emergencies of that sort, or to put down some sort of a temporary disturbance, a riot, or what have you.

Then, of course, they can be called to active duty and they then switch from being governed under the militia sections of the United States Code to being under title X. They are nationalized and they become like the regular military.

But to try to use them in the day-in, day-out, long-term, nitty gritty street work of conducting surveillance, arresting, helping prosecutors convict drug dealers and the like, seems to me to be just about as far from the reasonable use of either the active duty military or the National Guard as one could get.

It seems to me the solution is perhaps a larger but more adequate police force for the District of Columbia.

Senator **Fowler**. We have got an interesting parallel in Israel where the Israeli soldiers are increasingly and publicly complaining that they were never trained for the kind of basically riot patrol and response that is required in the current West Bank situation.

Mr. **Adams**. Absolutely. I think the risk is great.

Mr. **Woolsey**. Mr. Chairman, the use of regular military forces, reserve or fully active duty, in those types of circumstances is an extraordinarily difficult and brutalizing experience. We found that out in the Philippines at the turn of the century; we found it out in Vietnam. Trying to deal with civilian disturbances is just something that active duty military do not do well.

Senator **Fowler**. Not trained to do.

Well, gentlemen, thank you. I will look forward to reviewing your written testimony, and appreciate very much your being here today, on behalf of the real chairman and all of us.

Mr. **Woolsey**. Thank you, Senator.

Mr. **Adams**. Thank you, Mr. Chairman.

[Whereupon, at 3:04 p.m., the committee was adjourned.]

VIEWS OF THE SECRETARY OF ENERGY

WEDNESDAY, MARCH 15, 1989

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Washington, DC.

The committee met, pursuant to notice, at 9:30 a.m., in room SD-608, Dirksen Senate Office Building, Hon. Jim Sasser (chairman of the committee) presiding.

Present: Senators Sasser, Exon, Lautenberg, Robb, Domenici, Grassley, and Bond.

Staff present: John L. Hilley, staff director; and Dave Williams, senior analyst for energy, environment, and natural resources.

For the minority: G. William Hoagland, staff director; and Austin Smythe, senior analyst for energy and natural resources.

OPENING STATEMENT OF CHAIRMAN SASSER

Chairman **SASSER**. The committee will come to order.

Today, we are pleased to receive the testimony of the Secretary of Energy, Adm. James Watkins, on the President's 1990 budget request for the Department of Energy.

Admiral Watkins, I don't need to tell you that you come to the Department of Energy in somewhat troubled times. A host of modernization, cleanup, and safety problems plague the Department of Energy nuclear weapons complex. As you well know, evidence is mounting, according to many of our leading scientists, that fossil fuels have set into motion the greenhouse effect.

Imported oil at the present time accounts for more and more of our country's consumption of oil every day. Indeed, we will soon depend on imports for more than 50 percent of our energy needs. You clearly have a big job ahead of you.

Much of the hearing this morning will focus on the Department's nuclear weapons complex. I would like to note that 40 percent of DOE's $15 billion budget involves a wide variety of nondefense energy activities, including the clean coal technology program, operation of the strategic and naval petroleum reserves, management of the Federal Power Marketing Administrations, and funding of extensive research and development programs.

Admiral Watkins, the Budget Committee is also most concerned about the costs associated with the cleanup of the nuclear weapons complex. Cleanup costs, we are told, may run as high as $100 billion.

These costs will pose a serious strain on governmental resources at a time when Federal deficits continue to be in the range of $150 billion or more per year. With these concerns in mind, Admiral

Watkins, let me raise several questions about the cleanup of the weapons complex.

First, do you believe that the Department currently has the technical expertise to handle what the General Accounting Office has called, and I quote, "the largest industrial rehabilitation effort in modern times," close quote? How can we be certain that the additional moneys provided to the Department of Energy for cleanup and modernization will be wisely spent?

Second, I believe that the Department of Energy's current approach to environmental cleanup has been highly fragmented and lacks the broad national perspective which would rationalize the allocation of funds among sites.

I think it is critical that the Department of Energy develop a credible, comprehensive environmental plan which lays out a clear road map of how funding priorities should be established, what the schedule and what the cost for cleanup will be.

Finally, I would note that the 1990 budget contains $1.3 billion for modernization of facilities, an increase of 56 percent over the 1989 level. We will want, of course, to closely examine that funding proposal.

Mr. Secretary, I believe that the Department should be given the opportunity to review its history in the nuclear weapons cleanup area and come up with new solutions to the problem.

However, I must state to you that if the Department of Energy cannot make a clear and convincing case that it has the expertise to handle the problem and does not develop a credible environmental plan within a year, I believe that serious consideration should be given to removing the cleanup responsibilities from the Department of Energy and placing them in a separate entity.

As I said at the outset, you have a big job ahead of you. I look forward to working with you as you strive to improve management of the Department of Energy's nuclear weapons facilities, as you develop a coherent national energy strategy, which I think is needed badly, and as you work to address the environmental problems of the Nation.

We are pleased to have you here today, Mr. Secretary. I have here the opening statement of our distinguished ranking member, Senator Domenici, who is necessarily absent. I understand he is at the White House this morning in an urgent meeting, or else he would be here.

We will be joined later by other Senators, and I will, without objection, place Senator Domenici's statement in the record.

[The prepared statement of Senator Domenici follows:]

OPENING STATEMENT

HEARING ON THE DEPARTMENT OF ENERGY BUDGET
SENATOR PETE V. DOMENICI
MARCH 15, 1989

I WANT TO WELCOME ADMIRAL WATKINS, OUR NEW SECRETARY OF ENERGY. I STRONGLY ENDORSED HIS CONFIRMATION BOTH IN THE ENERGY COMMITTEE AND ON THE SENATE FLOOR. MR. SECRETARY, YOU BRING THE RIGHT BACKGROUND AND SKILLS NEEDED TO ADDRESS SOME VERY SERIOUS PROBLEMS AT THE DEPARTMENT. I ALSO WANT TO WELCOME THE PANEL THAT WILL FOLLOW THE SECRETARY.

WHILE WE CALL THIS AGENCY THE DEPARTMENT OF ENERGY, IT ACTUALLY IS A HODGE-PODGE OF MANY FUNCTIONS. IN ADDITION TO OVERSEEING THE FEDERAL GOVERNMENT'S BASIC ENERGY POLICY, THE DEPARTMENT OF ENERGY'S RESPONSIBILITIES INCLUDE THE MANAGEMENT OF THE NATION'S EXTENSIVE NATIONAL LABORATORY SYSTEM, BASIC SCIENCE AND RESEARCH DEVELOPMENT, NUCLEAR WEAPONS PRODUCTION, AND NUCLEAR WASTE DISPOSAL. THE DEPARTMENT'S LABORATORIES ARE ENGAGED IN EVERYTHING FROM THE MAPPING OF THE HUMAN GENOME TO THE MODELLING OF GLOBAL CLIMATIC PATTERNS.

THE NEW SECRETARY AND THE DEPARTMENT FACE A FORMIDABLE TASK IN CLEANING UP AND MODERNIZING THE WEAPONS COMPLEX. FORMER SECRETARY HERRINGTON DESERVES CREDIT FOR TAKING ON THIS PROBLEM. IN 1985, HE CREATED A SEPARATE ENVIRONMENT, SAFETY, AND HEALTH OVERSIGHT OFFICE WITHIN THE DEPARTMENT AND DRAMATICALLY INCREASED

ITS FUNDING. SINCE THEN, DOE HAS ATTEMPTED TO ASSESS ITS PROBLEMS AND BEGIN THE UPGRADE OF ITS FACILITIES TO MEET ENVIRONMENTAL, HEALTH, AND SAFETY STANDARDS.

WHAT IS IRONIC IS THAT THE RESULTS OF THESE DOE ASSESSMENTS AND REPORTS HAVE GENERATED WHAT I MUST TERM AN HYSTERIA IN THE MEDIA, AN HYSTERIA THAT COULD BE VERY DAMAGING. WE NEED TO PROPERLY ASSESS, SET PRIORITIES, AND MANAGE THESE PROBLEMS TO ASSURE THE ENTIRE DOE DEFENSE COMPLEX MEETS NATIONAL SECURITY REQUIREMENTS AND TODAY'S ENVIRONMENT, SAFETY, AND HEALTH STANDARDS. JUST YESTERDAY THIS COMMITTEE HEARD FROM THE CHAIRMAN OF THE JOINT CHIEFS OF STAFF ON THE VERY CRITICAL NEED TO HAVE A SUPPLY OF TRITIUM FOR OUR STRATEGIC NUCLEAR DETERENT. WITHOUT A SYSTEMATIC AND COORDINATED APPROACH TO ADDRESS THESE PROBLEMS, WE COULD WASTE VAST SUMS OF MONEY, CREATING PROBLEMS INSTEAD OF SOLVING THEM.

IN RUSHING TO SOLVE DOE'S CLEANUP PROBLEMS, WE CANNOT NEGLECT DOE'S VITAL FUNCTIONS AT OTHER FACILITIES, PARTICULARLY THE LABORATORIES. THE MAINTENANCE OF A STRONG TECHNOLOGY BASE IN THE WEAPONS LABORATORIES IS VITAL TO OUR NATIONAL SECURITY.

THE LOS ALAMOS AND SANDIA LABORATORIES IN NEW MEXICO ARE PRIMARILY RESPONSIBLE FOR RESEARCH AND DEVELOPMENT IN BUILDING NUCLEAR WARHEADS. BESIDES THEIR WORK IN THE DESIGN OF WEAPONS, THE R&D LABS ARE ALSO CRUCIAL TO ASSURING THE PREVENTION OF ACCIDENTAL NUCLEAR EXPLOSIONS, PREVENTION OF UNAUTHORIZED USE OR

LOSS OF NUCLEAR WEAPONS AND MATERIALS, ASSESSMENTS OF THE ENEMY'S NUCLEAR THREATS, SUPPORT FOR NONPROLIFERATION EFFORTS, AND VERIFICATION OF NUCLEAR ARMS CONTROL TREATIES.

THESE ARE VITAL TASKS. AS THE LABS SYSTEMATICALLY MAKE THE IMPROVEMENTS NECESSARY TO MEET EVOLVING NATIONAL SECURITY REQUIREMENTS IN ACCORDANCE WITH ENVIRONMENT, SAFETY, AND HEALTH STANDARDS, IT WOULD BE FOOLISH TO DIVERT FUNDS FROM THESE CRITICAL AREAS THAT ARE BEING PROPERLY MANAGED.

FOR THIS YEAR'S BUDGET, BOTH THE REAGAN AND BUSH ADMINISTRATIONS HAVE IDENTIFIED THE MODERNIZATION AND CLEANUP OF THE DOE WEAPONS COMPLEX AS PRIORITY ITEMS, WHILE RECOGNIZING THE VITAL NATURE OF OTHER FUNCTIONS OF THE COMPLEX. AS COMPARED TO FY 1989, THE BUSH ADMINISTRATION PROPOSES TO INCREASE FUNDING TO ADDRESS MODERNIZATION AND ENVIRONMENTAL ACTIVITIES BY $1.1 BILLION, OR 42 PERCENT. ON ENVIRONMENTAL CLEANUP ALONE, THE PRESIDENT IS PROPOSING A 150 PERCENT INCREASE.

I LOOK FORWARD TO THE SECRETARY'S AND THE PANEL'S TESTIMONY.

Chairman Sasser. We would ask you, Mr. Secretary, to give us the benefit of your views this morning and, for the record, you may want to introduce your two associates at the witness table.

STATEMENT OF HON. JAMES D. WATKINS, SECRETARY OF ENERGY, ACCOMPANIED BY DONNA FITZPATRICK, UNDER SECRETARY; ELIZABETH SMEDLEY, COMPTROLLER; AND TROY WADE, ACTING ASSISTANT SECRETARY, DEFENSE PROGRAMS

Secretary Watkins. Thank you very much, Mr. Chairman. I have with me today the Under Secretary of Energy, Miss Fitzpatrick, and my Comptroller, Ms. Smedley, who I would like to keep with me up at the table here.

Mr. Chairman and members of the committee, I appreciate the opportunity to appear before you today to present an overview of the fiscal year 1990 budget request for the Department of Energy.

As you know, I had the honor of being sworn in as Secretary only last week. At this very early stage in my tenure, then, it is my hope that in this first meeting I can share with you a broad overview of how I intend to address my responsibilities as Secretary and the philosophy I will use in approaching those issues of concern to us all, some of which you outlined in a very articulate way just a few minutes ago.

The Department of Energy is charged with developing and maintaining the Nation's energy security, contributing to the national defense, and ensuring America's continued scientific and technological leadership.

While I did not play a role in the development of the fiscal year 1990 budget, I feel strongly that this budget builds upon a solid foundation; that is, strong support for long-term, high-risk energy research and development, cost sharing where industrial partners stand to benefit commercially from Federal investments in technology, divestiture of certain Federal assets where the justification for private ownership is persuasive, and increased funding for worker and public health and safety, and environmental protection and cleanup at the Department's facilities.

The administration's commitment to environmental protection and to worker public health and safety at the Department's facilities is stronger than ever. President Bush has highlighted this effort as one of his major initiatives, and this budget reflects that commitment.

Accordingly, funding in support of environment, safety, and health activities has increased Department-wide to nearly $3.1 billion in fiscal year 1990. This is an increase of approximately 30 percent over fiscal year 1989. This commitment represents one of the largest line item increases found anywhere in President Bush's budget.

There are those, of course, who would argue that even more money should have been dedicated to this purpose or to other worthy goals of the Department of Energy, and that is always the most difficult part of the budgeting process—bridging the gap between what we would like to spend and what we are able to spend. At this time, all budgets must reflect the realities of our desire to participate in reduction of the budget deficit.

At the Department of Energy, this is a particular challenge because we have been budgeting in the absence of a clear and concise national energy policy. A priority item on my agenda recently announced to my entire Department is the development of an integrated national energy strategy in order that every future budget of this Department will reflect the entire panoply of issues that require our immediate attention, yes, but also placed into a larger context within which it also is in consonance.

I am determined to see that we begin to move forward by charting a deliberate course under this strategy while providing for sufficient flexibility to respond well to the dynamics of what clearly are emerging technological breakthroughs on the horizon.

Having set those goals for myself and the Department, let there be no misunderstanding. I appear before you today to express my strong support for President Bush's budget which he submitted to the Congress on February 9.

Energy-related long-term research and development is strongly supported in this budget. Funding for construction of the superconducting super collider, the world's largest and most advanced particle accelerator, is a major initiative in the budget.

The Department is also an important partner in the effort to solve many of the Nation's leading scientific problems. Enhanced research is being conducted in such areas as superconductivity, global warming, and mapping of the human genome.

In addition, the Department has initiated an expanded clean coal technology program to demonstrate a new generation of coal technologies that will address the environmental concerns raised by burning coal. Potentially exciting by-products of this effort to deal aggressively with acid rain can also contribute to better energy efficiency and alternative fuel development.

The President has increased fiscal year 1990 funding for this program by $385 million over the earlier budget request, which is back to the agreed-to 5-year program between the Canadian and United States envoys of 1986. Funding in fiscal year 1989 was $190 million and the total request for fiscal year 1990 is $710 million.

Energy security is another dominant theme in the budget, and the development of programs to reduce America's dependence on foreign oil must be vigorously pursued. In the meantime, our insurance policy against supply disruptions, the strategic petroleum reserve, should continue to be filled at a rate that is reasonable, given budget constraints. It currently holds oil equivalent to approximately 3 months of current U.S. imports, about 580 million barrels.

The fiscal year 1990 budget also addresses the divestiture of Federal assets, and currently DOE operates several business activities for which a strong case for non-Federal ownership can be made.

Activities such as marketing power from selected hydropower subsystems, operating oil fields in Wyoming and California, and selling uranium enrichment services may be more appropriately administered outside Federal control. Legislation to place these activities in the private sector is receiving our immediate attention.

Perhaps the most challenging of my new responsibilities will be in the area of national security. We need to ensure the safety of the aging production facilities, guarantee that they operate in an environmentally sound manner, and clean up problems of the past.

At the same time, we must ensure the maintenance of a strong nuclear deterrent; this is vital to the country's national security. A significant new initiative in this request is for new production reactor capacity to meet defense needs for nuclear materials.

Let me add that since being nominated by President Bush to be his Secretary of Energy, and throughout my nomination process, I have had the opportunity to read countless reports about problems at the Department, most of which have been building for years.

I have also seen correspondence from concerned Members of Congress and Governors. My response to the concerns raised here on Capitol Hill and around the Nation in the past few weeks is I agree with you. There are problems, and it is my intention to begin to address them.

However, we cannot allow what I now view as highly speculative cost estimates projected over 20- and 30-year periods to be the sole determinant of today's decisionmaking process.

I do not feel comfortable with the long-range cost estimates we have seen. I do not think we will be able to make accurate estimates until we in DOE begin the process of evaluating our short-term needs and objectives.

What is needed is to begin developing solutions and providing the timetables and schedules that will demonstrate that we have a plan and that we have milestones from which progress and success can be measured over a realistic time period.

My first act as Secretary of Energy was to send a message to all Department and contract employees outlining my immediate goals for the Department. I would like to share a few of these with you.

First, develop a 5-year plan which establishes specific budget objectives and goals for waste cleanup at each DOE site; second, institute a strategy for safe startup of the Savannah River reactors, including all related waste management issues that go well beyond the Savannah River complex itself; third, establish DOE program managership for the superconducting super collider to ensure that we can execute this important project within budget and time allocated; fourth, eliminate obstacles to opening the Waste Isolation Pilot Project; and, lastly, reforming the internal Department budget process and start by working with OMB and the appropriate congressional committees to establish uniform budget categories and definitions so that we are all talking the same language when we discuss and look at fund allocations against the DOE priorities.

These are not all of my immediate objectives; they simply highlight a few that are important to the Nation's future as well. It is my hope that in beginning this work, Members of Congress, others in the administration, as well as State and local officials, will be active partners in that process.

Mr. Chairman, this has been a quick overview of the Department's budget request for fiscal year 1990. We are seeking to address many problems that have been in the making for decades. But I am committed to finding a balance wherein safety is never subverted, environment is wisely protected, and national security and other energy objectives are fully achieved. I look forward to working with this committee and the Congress as a whole in reaching these objectives.

And I would like to answer your three questions, Mr. Chairman. Do we have the technical expertise to do the cleanup? Yes, sir, I think we do. Do we know how the dollars will be wisely spent? No, sir, I don't, but we will.

DOE's approach is widely fragmented, I agree with you. We do not have a comprehensive road map, and I would hope before the discussions this morning end that I can at least allay your early fears that we don't have something moving in that direction. I would like at the appropriate moment to go into some detail on what our plans are to pull that coordinated, comprehensive approach together.

Lastly, your admonishment that if we don't get our act together, somebody else is going to be put in charge—I agree with you on that. I will guarantee you that we will get our act together, Mr. Chairman, and it won't take me much longer before you will see some movement.

And I hope to leave those who now feel it necessary to oversee somewhat behind us in our wake as we move more aggressively forward and feed Congress with information that will satisfy you that we have got our arms around this mess.

Thank you, sir.

Chairman **Sasser**. Thank you, Mr. Secretary.

Do you have an opening statement or some opening comments that you wish to make this morning, Senator Symms?

OPENING STATEMENT OF SENATOR SYMMS

Senator **Symms**. Thank you very much, Mr. Chairman. I welcome Admiral Watkins. The chairman may have already done so; if you didn't, I wanted to ask unanimous consent to put Senator Domenici's opening statement in the record.

Chairman **Sasser**. We have already done so.

Senator **Symms**. Thank you very much.

I have a brief opening statement, Admiral, and I again want to welcome you here this morning. I think we all wish you the very best because the Department of Energy has many, many crucial issues that must be faced and resolved over the next few years, many of which President Bush named at your swearing-in ceremony last week.

The most crucial issues continue to be nuclear power to meet the energy requirements of the United States; the revitalization of our domestic oil and gas production; energy conservation; and energy security. I think President Bush gave you a full agenda, and I am sure you agree that the most pressing challenge is to manage the modernization of America's nuclear weapons and production plants. This task of perfecting our deterrent force ensures our security in a safe, stable world.

Mr. Secretary, you have taken on a job that is gargantuan, but you should know you are going to have support and help from Congress and many other organizations. You will also have many, many watch dogs and advocacy groups to keep you alert and aware, along this rocky road you are going to be following.

However, there is a road map. As you mentioned in answering the chairman's question, there is no detailed plan, but a rough sketch was developed at the request of Congress by the Department, with active participation from DOD, the JCS, and the National Security Council, called the 2010 Study. This is the Nuclear Weapons Complex Modernization Report.

As you and your staff begin to replace, repair, and restore this complex, vital as it is, I hope you will find assistance to help guide you to that end. By no means is the 2010 study a detailed list of instructions for saving the world.

I am sure you will put your own personal stamp of excellence on it, but I hope you will recognize the balance this report provides for many complex concerns—environmental restoration, facility replacement and repairs, etc.

I think particular attention should be given to the prioritization and schedules for key modernization actions. I know my senior colleague, Senator McClure, who works with you on the Energy Committee has made it very clear that we must prioritize all of these problems and then fix the worst ones first. We can't however, allow these problems to interfere with our efforts to modernize our energy facilities. We must keep everthing going.

Priority one, time-critical and essential, has three replacement facilities, two production reactors, and a special isotope separation facility. In recent months, there has been a great deal of media attention paid to the need for DOE to give greater funding to the environmental safety and health considerations in the complex, along with the charge that production, not protection, has been the driving force during the 40-year operation of the complex.

Some experts are quite vocal in insisting that replacement facilities are a luxury in light of the budget deficit and the overwhelming environmental concerns. Mr. Secretary, I believe just the opposite is true.

These replacement facilities are a vital component in the environmental health and safety correction actions for the complex. Modernization, per se, is cleanup. These plants will replace aging, less safe facilities that may have been harmful to the environment.

One of them, the SIS, will use state-of-the-art laser technology to clean up fuel grade plutonium, thus allowing out-of-date, aging facilities to be shut down. One of the new production reactors, the modular high-temperature gas cool reactor, will be an inherently safe, user-friendly design. In the next century, this reactor may provide direction and answers to deal with environmental concerns such as the depleting ozone layer, to mention just one.

If we have a fail-safe technology that can produce energy, it could be an answer. Though it is important for our defense needs and critical to our deterrent and our peace-through-strength initiatives, which we know are working by watching what is happening behind the Iron Curtain, I think that it has a very, very great potential for the country.

Yesterday, in a hearing on defense, Under Secretary of Defense William Taft, and Chairman of the Joint Chiefs of Staff, Admiral Crowe, spoke of strong, solid support for DOE's two-reactor strategy. I believe their testimony indicates the priority DOD gives in getting on with the job of revitalizing our production capabilities.

There are a number of groups that would stop the funding for these facilities, calling for more studies and a closer examination. The goal of these groups, in my view, is quite clear. They realize that if they can stop nuclear material production, they can achieve unilateral disarmament.

Mr. Secretary, I am anxious to talk to you more as time goes on about some of my concerns. Mr. Chairman, I ask unanimous consent that at the appropriate place in our hearing record today that we insert the text of the 2010 Study, at least if not in the record, in the committee file.

Chairman **Sasser**. Why don't we put it in the file, Senator? That is a rather voluminous report, isn't it?

Senator **Symms**. We will take a look at it, and then we can decide later what to do.

Chairman **Sasser**. We will make a determination whether it goes in the record or in the file.

Senator **Symms**. Mr. Chairman, I would be happy to yield back to the Chairman, and then I could ask my questions later.

Chairman **Sasser**. Well, I recognized you for an opening statement, Senator, in the absence of Senator Domenici, and I am going to claim the time back now to ask some questions——

Senator **Symms**. Okay, good.

Chairman **Sasser** [continuing]. Because I am going to have to leave myself, unfortunately, to go to negotiations with Mr. Darman here on the budget.

Senator **Symms**. Admiral, I want to apologize, and maybe the chairman already has, for the lack of Senators that are here.

It is not because of a lack of interest, I can assure you. I have two other committees that are meeting this morning, as does the chairman. I think we are all finding it more and more difficult to keep up with our schedules.

Chairman **Sasser**. Thank you, Senator Symms.

Admiral, in your confirmation hearings you made the statement, and I quote, "There is an urgent need to effect a significant change in the 35-year Department of Energy culture." There are others around here that, frankly, agree with that statement.

Now, you indicated a moment ago some confidence that DOE would be able to handle a major cleanup and modernization effort. Let me take you back to that and just raise some questions that come to mind.

We have seen criticisms leveled at the Environmental Protection Agency for their handling of the Superfund Program. In fact we've found that EPA is operating the Superfund Program with relatively junior personnel who are relatively poorly paid.

And these junior personnel are dealing with contractors who are significantly more knowledgeable and significantly more experienced than they are. The contractors' personnel are better paid, though that is not to say that pay always reflects competence or devotion to duty. But some say in our society, at least, it is a rough approximation.

Now, the concern has been raised that perhaps we are going to have the same problem in the Department of Energy as you seek to clean up these nuclear waste sites. It has been over 30 years, for example, since a heavy water nuclear reactor of the type slated for

Savannah River has been built in this country, and the Idaho reactor represents an unproven technology.

The Department of Energy has a history of cost overruns and troubled projects plagued by technical difficulties. One example is Building 371 in Rocky Flats. Originally, this building was expected to cost $63 million, but ended up costing $225 million—almost a 400-percent cost overrun.

It has never operated due to severe design material, and mechanical problems, and I just want to ask you a few questions to make sure that your confidence, which I admire, is not misplaced.

For example, how many DOE personnel have experience in building nuclear reactors and cleaning up hazardous and radioactive waste sites?

Secretary Watkins. Very few, Mr. Chairman. We are not set up in our organization at this point in time to have the equipment, you might say, of a chief operating officer. We have no operational linkage between myself and our field offices with the technical talent that can make the kind of judgment we would make, for example, in defense on major system acquisitions.

I am going to start building that. Now, I am going to have to rely a lot on the fact that I have 130,000 people under contract to me with a 16,000-person organization. I am leaning heavily—the National Academy; and many advisory groups set up by the Congress, nearly 12 of them, I believe, major advisory groups. These are technically competent people.

There is not that much in the way of technical competence regarding nuclear that isn't already in use out there, even in the private sector, or at least in the field activity. I have a great deal of technical talent in my laboratories. I plan to bring all of this to bear, but I am also going to bring into my organization technical talent of the type you are talking about.

I have already done that in the way of waste management, signed on this morning, and put in charge of coordinating this and building our five-plan that I would like to go into more detail when we get a chance.

I share your concerns about the technical talent. As you know, with the loss of the anticipated pay raise by those perhaps not in the Congress, but in my organization where I need that technical skill, it was a great blow to those of us who have to manage technical programs.

But we can get around this, in my opinion. There has been a lot of emphasis on waste management in a variety of forms out there that I can bring to bear on this issue, and I feel confident that I can do that with the talent that I can either contract for or the small group that I have to bring in to both headquarters and my field offices to do the technical oversight in-house within the line management, and not rely on a plethora of oversight committees that will only come in and tell me that I am doing a lousy job, which I already know.

Chairman Sasser. Admiral, I don't want you to minimize the task in front of you. We had a problem in my State with the Tennessee Valley Authority, the largest nuclear power plant operation in the free world. We had nuclear power plants all over the Tennessee Valley area, but not one was operating.

We simply found that we could not hire and retain adequately trained, sufficiently competent nuclear people to operate those reactors at the salaries that TVA could pay. Of course, TVA salaries are geared to Government salaries. There is just a limited pool of talent out there, as you well know, and the price for this talent is very high.

I don't know what in the world we would do if it were not for people like yourself coming out of the nuclear Navy who do have some expertise in this field. I will come back to that.

My time is up, and we will turn to Senator Symms.

Senator SYMMS. Thank you, Mr. Chairman. I am interested in your question. I want to pursue, what you initially spoke about. Yesterday Admiral Crowe strongly endorsed the two-reactor strategy. Do you concur with that decision?

Secretary WATKINS. Yes, sir, I do.

Senator SYMMS. For all of the obvious reasons of site defenses and other reasons?

Secretary WATKINS. I see no alternative at this point, Senator, to the dual track concept of building those production reactors, both for tritium development and to give us the flexibility to maintain the stockpile, with the stockpile memorandum data that I have seen.

As you know, we are in the process of revalidating that in the Nuclear Defense Council with the Department of Defense, the National Security Director, and so forth, and we will have a revalidation of that this summer.

But pending any changes in that, and I would not think they would be major, there really is no recourse if we are going to not project another situation 10 years from now that is very much like the one we have today. If we don't have the redundancy, if we don't have the dual-track system, if we don't have different concepts in our engineering concept design, and so forth, we are going to end up with the same problem again.

And we are still, even with the two reactors, on the margin of what we can achieve and what flexibility we will have in the outyears, pending any kind of major breakthrough in arms control.

Senator SYMMS. I appreciate your answer, and I endorse what you are saying. Even with the heavy water reactor technology at Savannah—we have the possibility of some design problems; is that not true?

Secretary WATKINS. Yes, sir. The technical people with whom I have discussed this alert me to the fact that because we have dealt with heavy water before doesn't necessarily make this a simple design. There will be risks in there. We will obviously put it through the standard set of acquisition milestones, and I intend to get on top of the project managership concept that does not now exist in our Department to monitor that, just as we are trying to do with the super collider, just as we are doing now with SIS, the Special Isotope Separation Center at Idaho.

I will be very much involved in the details of managing those things efficiently, putting in the kinds of disciplines that I have been experienced with in the Department of Defense. The Department understands that and they are beginning to move in that direction, particularly with SIS. I have just gone over the management briefing of that.

I intend to do the same thing as we move through from concept to development. You know, we are talking about a 10- to 11-year program here for these two nuclear reactors, so it is not as though it is going to happen tomorrow. But if we don't manage it right today, Congress will get very discouraged here in a few years by looking at prospective cost overruns and time delays, and so forth, and we can't stand many of those.

We have a very bad track record in DOE, looking back, and I think it is really because we haven't come into the modern management world on how to deal with major system acquisitions.

We just put it out in the field, we give it to a contractor, hope for the best, and then end up with some cost overruns or sunk dollars; as we had in the gaseous centrifuge project, which we can't stand anymore. So I am going to be on that side of the pressure curve.

Senator SYMMS. Admiral, in view of that, you are talking about a minimum of 10 years before the production reactors will come on line. This puts us in a position of having no other source, for weapons-grade plutonium other than SIS to fill this intermediate gap. Is this not correct?

Secretary WATKINS. Well, it depends, Senator Symms. Generally, that is correct. However, I am not giving up on the life cycle prospectus on the three reactors at Savannah River at this point. I am trying to get a baseline of truth, if I can find it somewhere, on exactly where we stand metallurgically, with all the engineering outlook from the best minds that we have to see if we can't stretch that life out.

Some people say it is only good for 7 years. Well, that doesn't give us time to get our new production reactors on board. So I believe that with a very careful look, and with the power management of those reactors after we get them started, and with an upgrade program, we are going to have to extend that life.

And it may well be that if we treat those reactors properly, which we haven't done for 35 years, they may last a little longer, and that will be my objective.

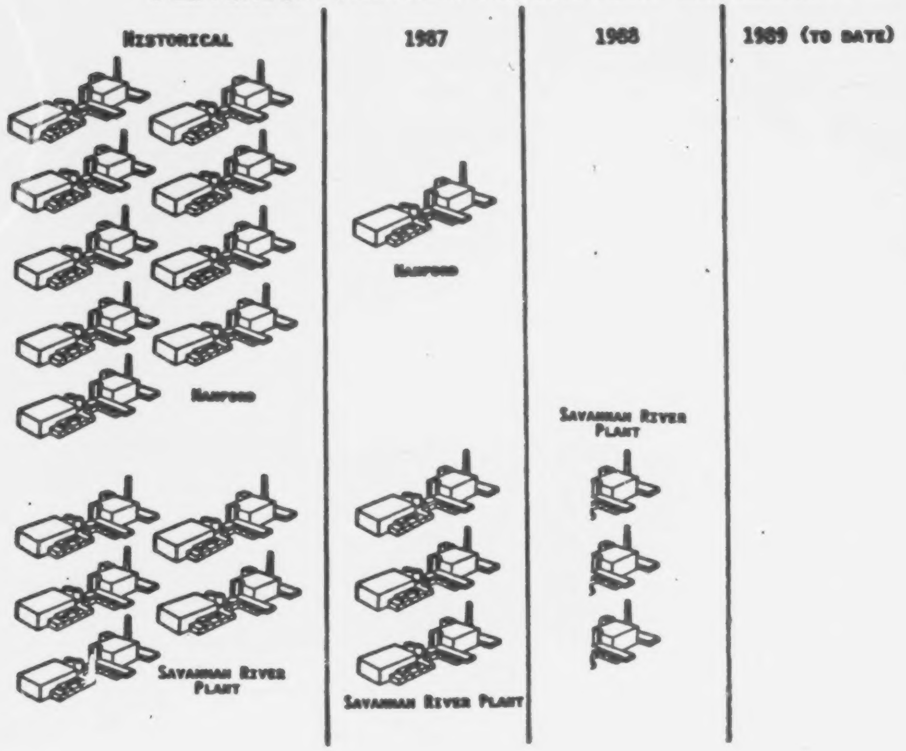
Senator SYMMS. Good.

Secretary WATKINS. So I am not one that says that they must be shut down at this point. I don't know yet. They may have to be for a lot of reasons that I don't know about in terms of stress corrosion, cracking in the piping, or all the kinds of engineering things that I am familiar with in nuclear power plants.

Senator SYMMS. The two-reactor strategy, plus the SIS and your plan to keep Savannah River, is a very good plan.

Admiral, I have one last question I want to ask, but first I will pass you a graph that illustrates the shrinking number of production reactors.

PLUTONIUM/TRITIUM PRODUCTION CAPABILITY



Secretary WATKINS. I think, Senator Symms, if you compare that with what the Soviets are doing, it is even more startling.

Senator SYMMS. It is startling.

Secretary WATKINS. It is very startling, and I think that we have to recognize that we aren't at the point yet in arms control where we can throw away our bargaining chips at this point in time, and we need that strength right now to keep moving in that direction, recognizing that downstream we all hope that we can do a better job there.

We may have to eat some of the dollars we are putting into these things, just as we did with the Pershing 2s and the cruise missiles in Europe. That was a good investment, in my opinion, although here we are blowing them up and destroying them before we ever use them, and that was good.

Senator SYMMS. Right.

Secretary WATKINS. So I think it falls into that same category. We are dealing with something here that is the deterrent. You can't take the tritium out of the system and have a deterrent mean anything. It is a new form, as you mentioned, of unilateral disarmament.

Senator SYMMS. I see my time is up, but I would like to point out that Admiral Crowe made the case yesterday that we are winning the struggle and the war of ideas in the world.

At this point in time, it would be absolutely tragic for us to turn our heads on a battle we are clearly winning against communism and oppression in favor of capitalism and freedom. Peace-through-strength initiatives have worked; we should not detour from our present course.

If I could just put this question at least in the record, could you please explain what you intend to do to address the cleanup at our defense complex?

Chairman SASSER. I think that is a worthwhile question to answer, Senator Symms.

Senator SYMMS. Thank you, and I apologize, Mr. Chairman and Senator Exon, for taking this time, but I think it is an important question. We do all want to hear what the strategy is on that.

Secretary WATKINS. Mr. Chairman, if you will permit me, I would like to make this a rather lengthy answer. I really would like to get on the record. This is such an important national issue. It is the first chance I have had to say something publicly on it.

Chairman SASSER. Well, we would like to hear the answer, Admiral.

Senator EXON. Mr. Chairman, certainly, this is a very key thing and it was what I was about to get into because of my responsibilities that the Secretary knows full well about in other areas.

I have time to listen to whatever the length of his answer is on this. It is the key question of the morning, as far as I am concerned.

Chairman SASSER. I agree.

Go ahead, Mr. Secretary.

Secretary WATKINS. Mr. Chairman, the DOE weapons complex is one of the largest industrial operations in the United States dealing with hazardous materials. Early waste management practices have proven inadequate for long-term environmental protection.

DOE has turned around its production orientation and now holds protection of the environment and public health as its paramount responsibility—coequals, if you will. We agree with the Governors who have written the Congress on this issue.

The fiscal year 1990 defense environmental program request of $401 million is more than double the fiscal year 1989 appropriation at $159 million. A 5-year integrated plan for environmental cleanup activities is being prepared in conjunction with formulation of the fiscal year 1991 budget. The overall plan is expected by August 1989.

Remediation costs will be identified in the Department's 5-year plan and technologies will be deployed or developed to control emission and remedy contamination as required at each site.

The Department's plans will not necessarily result in transporting contaminated materials to another site for 20 years or more in some cases. Our efforts will ensure long-range solutions to these specific problems as well.

In some instances, the cleanup effort will require immediate removal of materials to address potential or actual health or environmental concerns, and I have some examples of that.

Individual site plans which comprise the integrated 5-year plan will assure that immediate problems are confined and corrected, that the long-term cleanup effort is focused and based on credible science and technology, and that compliance, waste management, and cleanup are fully addressed.

The integrated 5-year cleanup plan will help reestablish credibility and provide a baseline to work with Congress and the National Academy of Sciences in an overview capacity. Federal and State regulatory agencies will review identified planning priorities.

This couples with my comment earlier on the budget breakout. I want to work with the Hill, GAO, and others involved in this so we know what we are doing and we don't have peas under the pod anymore.

You can see what we are doing at Rocky Flats, at Fernald, at Savannah River, at Idaho, and see it in very specific terms with priorities and charts laid out so that you can see where we are heading as we begin to eat away at these longstanding contaminants.

The 5-year plan to be defined by individual sites will enable the Department of Energy to reestablish its credibility, as I mentioned, and will do it in this way. First, we will assess the environmental degradation or impairment.

Second, we will ensure that priorities are established to address immediate health effects and to prevent a further spread of contamination. Third, we will develop a national credibility by working with recognized scientific communities, such as the National Academy of Sciences so that proper priority is established and commitments are met.

I have already communicated with the National Academy and they are ready to do this. As you know, they have waste management experts who are sitting there ready to do this job and help us. They have inspected us before, said we were wanting very badly, and now they can take a look and see if our plan is sound.

Fourth, we will established a focused research program to ensure efficient utilization of funding for the use of the best available technologies. Fifth, we will develop a program for each site to ensure that a safe, efficient, and expedient plan is developed to remediate environmental contamination over the next 30 years.

Sixth, we will work with the Congress and State regulatory agencies to meet the timetable and organizational requirements to ensure the success of the first 5-year plan and each subsequent 5-year plan.

Seventh, recommend sources of funding and oversight to certify efficient expenditure and guaranteed accomplishment will be made. Eighth, my objective with the individual site 5-year plans is to confine and correct immediate problems and prioritize and fund long-term projects with credible data reviewed and accepted by the public through scientific organizations like the National Academy, Federal, and other State and regulatory agencies working on similar hazardous waste problems.

Lastly, to take the first steps, I have established in the Department of Energy an environmental technical leader, not just in the United States, but as a world resource for environmental restoration. I expect the Department to take that lead, and I am going to ensure that we have the people on board to do it and I have already brought the first member on board as of today.

Now, we have some examples of what we are already doing, and I know that there has been great criticism of the Department of

Energy, and I think some of it is very, very legitimate, but some of it is not.

We have put a lot of money into the characterization of many of these contaminants, and we are actually beginning to move dirty stuff now and get it out of there, and I want to talk a little bit about some of them.

At the Feed Materials Production Center in Ohio, near and dear to Senator Glenn's concern, we have a stored waste backlog from the past that now has been reduced 40 percent, from 90,000 to 54,000-drum equivalent. We have interim RCRA closing of Pit 4; this is barium chloride contaminant. It is underway with an EPA-approved clay cap now going in.

We have interim stabilization of the K-65 silos to eliminate the potential radon gas. This is from the Belgian Congo ore, which, by the way, has $300 million of gold in it, if anybody wants to extract it and take this away from us. [Laughter.]

We are also constructing the storm water retention basin there sufficient to hold a "10-year, 24-hour" storm, the kind of thing that we have had in the past when we do have contamination of water, and we have completed that in December 1988. So we have satisfied the requirement of our consent decree with the State of Ohio.

At Savannah River, the closure plan for the F and H area seepage basins is being reviewed by the State and EPA. In 1990, we plan to begin to back fill and install a clay cap in accordance with RCRA requirements.

We have an effluent treatment system that has begun operation there to eliminate the discharge of separation process waste waters, the seepage basin. The M area settling basin closure is in progress and will be completed in 1990.

In fiscal year 1990, construction will also begin on facilities for the solidification and permanent disposal of the waste salt solutions from the 300 M area fuel fabrication facility.

At Rocky Flats, the sludge is being removed from the solar ponds and final closure is scheduled for 1996. Groundwater contaminated with volatile organics from the 881 hillside area is scheduled for treatment, and so forth.

We are beginning to see movement for the first time at Hanford, as well as on a variety of these nasty waste problems. And so I think you are going to see, even by 1991 when I come up before you, that we are beginning to eat away at this.

We will refine those plans and we will put the dollars where they ought to be. In the meantime, we are doing a lot of technological research in areas to clean up this groundwater more efficiently and in a more cost effective way.

So we are beginning to see the benefits of prior R&D in a variety of programs, such as demonstrating effective cleanup of water with solvents, such as destruction of the trichloroethylene in pump groundwater by ultraviolet treatment, such as a pilot vapor vacuum extraction system at Lawrence Livermore, such as development and demonstration of technologies for in situ vitrification, which is very important for seepage into the aquifers, and so forth.

So my feeling is that with this plan, we have in the Department of Energy for the first time a very clear template for the future, and I hope to share the benefits of our further development of this plan over the next several months to convince you here on the Hill that we are getting this under control, we do have the technical talent, we have our heads screwed on right.

We are going to take the dollars that you have given, which are plenty, in my opinion, right now, and I am not so sure we aren't going to come out with a different kind of funding stream for 5 years than a simple linear extrapolation for 21 years and a needs assessment plan, and so forth, that gives us a dollar value that I don't think any of us can live with if we don't have to.

I believe we can do this for a lot less money. There are a lot of gold watches that came in on the cleanup, and I don't believe we need to buy all those gold watches at this time. Some of these things are not going to hinder the environment and we need to package them up in a different way than the others which are hindering the environment. I think we can sift that out very nicely here in the next year for you.

Chairman SASSER. Well, thank you very much, Admiral. Thank you for an excellent question, Senator Symms, and a very excellent response, Mr. Secretary.

I am going to have to take my leave, regrettably. This morning we opened negotiations with Mr. Darman, the Director of the Office of Management and Budget. As you know, we are trying to reach an agreement on a budget for fiscal year 1990.

But before leaving, Mr. Secretary, I want to encourage you, if I may, to take some time during your tour of duty at the Department of Energy and visit the Department of Energy operations at Oak Ridge.

I have been to Oak Ridge many, many times, and I am frankly very encouraged about their operations and the environmental cleanup effort that has been proceeding for some time.

The cooperation between the Department and the contractor at Oak Ridge, Martin Marietta, and the many other private concerns in Oak Ridge who have lent their expertise to the cleanup efforts there, I think, has been exemplary and reassuring.

I think Oak Ridge could provide a model of cooperation for cleanup efforts elsewhere, and I hope you will find time to visit Oak Ridge at an early date.

Secretary WATKINS. I will, Mr. Chairman. I appreciate your comments about Oak Ridge. I share them. You should know before you leave today that we are a few weeks away from starting the fast flux isotope reactor at Oak Ridge which has been shut down for several years.

I have just gone through the startup procedures, the corrective actions since shut-down. They have done a tremendous job in getting ready. I am very satisfied. They have met all the environment, safety, and health issues. So it looks like I will be approving that for startup here within the next few days, and that is going to be very important for generating the kind of medical isotopes that we need.

That is an incredibly important facility, and because it will be my first reactor startup, I wanted to let you know that it will be on the horizon here probably within 5 weeks.

Chairman SASSER. Thank you, Admiral.

We will turn now to Senator Exon for his questions.

Senator EXON. Mr. Chairman, thank you very much, and I want to thank you for calling this meeting, originally, basically because this Senator asked you to do so, and with the interest that you have had in this general area for a long, long time.

First, I want to say that of all of the President's nominees, you are truly an outstanding one, and I have supported all of them actively, save for one notable exception.

Let me just say to you that since the funding for the matter that is being considered before this committee is under the Strategic Nuclear Deterrent Subcommittee which I chair, I have been working on this problem quietly, I think effectively, but without a lot of fanfare, for a long, long time.

Now, it has broken out into the open, and my main concern, I think, is the fact that above everything else and above all the other responsibilities that you obviously have as Secretary of Energy, there is only one that I am primarily concerned about, and that is the one that most of the attention has been focused on this morning, and we will be talking about that as time goes on.

Nothing, in my view, is as important as the dedication that you obviously have had to this problem. And I suspect that if it were the Department of Energy alone, without this major problem that you have inherited as the new Secretary, there may have been other people in the United States that could have done just as good a job as you as Secretary of Defense.

I salute the President for his unique understanding of the extremely difficult problem that exists there, and I suspect that 90 percent of the reason you were selected for that position is because of your past expertise, knowledge of, and dedication to the job of getting this whole situation straightened around.

Because of your past dedicated service to this country, you know better than most the critical situation that we have, particularly with tritium, and therein lies the problem that we have for our whole nuclear deterrent.

Then the cleanup of all of this is another responsibility that is equally as important and, if anything, comes alongside, as far as importance is concerned, to the matter of getting tritium.

I don't think we have done enough, frankly, to consider alternative sources of tritium if we are not able to start the Savannah River reactors as quickly as some would like. We have held extensive hearings on this, closed, in the strategic subcommittee.

I am convinced that the people that you now have in the Department and the ones that you are going to bring on board are never going to allow any portion of that operation at Savannah River to come back on line unless it does indeed meet all, and I emphasize the word "all," of the safety concerns, because as important as the production of tritium is, there are other possible ways to get it in the case of an extreme emergency.

You know and I know that the situation on tritium is highly, highly classified matter. I just think we can lay it to rest for the immediate time frame, and I don't care to emphasize what the immediate time frame means. But as far as the immediate time frame is concerned, we are in no problem whatsoever with regard to maintaining the deterrent that is obviously necessary today and is a part of the bargaining chips that are going on back and forth between us and the Soviet Union on many of these intricate decisions today.

I salute the statement that you just made in your statement with regard to the fact that this is no time for us to be caught short, if you will, on our nuclear deterrent, which is basically what our concern about producing tritium is all about.

I would simply suggest that there are—if, down the line some place, we do not get Savannah River restarted as we hope, there are other places we might be able to get some tritium.

I would suggest that we haven't done enough in the area of looking to some of our allies who do have tritium. I recognize that if we do that, it might be necessary to change some treaty obligations, but that might be a requirement if we are to maintain our deterrent, unless we get some facilities back on line in the near future.

Let me just state that I would hope that you could get on board the people that you have indicated that you are getting on board in the near future, and my second round of questions—my time is up and I am going to yield now—my round of questions will be getting into the area of how we are going to do this, what the time frame is.

This committee and others want to be of all the help to you that we possibly can. My main question and concern is going to be about the fact that maybe some of the things that we are doing, recognizing the problems at Fernald and Rocky Flats and Hanford, and otherwise, that the Department should not be diverted to cleanups just from the position of where the most pressure comes from.

I think we have to do an inventory to find out what are our most serious potential sources today, and there is no statement that you have made that is more heartening to this Senator than the one where you said you will be coming back with a plan that might not accept a linear amount of money that is necessary to clean up this problem. This is a major problem on our hands. Notwithstanding any other consideration, we have got to get on with it.

Senator Domenici, the ranking member, has come in, and I assume he would like to ask some questions.

Secretary **Watkins**. Thank you, Senator. I just want to comment briefly. I agree completely, as does the President, that there will be no startup of those reactors unless it is safe to do so. I will be right in the middle of that.

We are bringing a team on board to face the waste management issue along that long answer I gave to the chairman's question about exactly what we are doing. In addition, I am not going to subvert any other action in there because of that particular focus on waste management—we also have to get those reactors up safely. So I have another team working through the Idaho National Engineering Laboratory under contract, some of the best technical minds in the Nation, people that I have known for years, whom I can trust. When they tell me a situation exists, it exists. So I have brought them on board. I have had them working now for 6 weeks to address the whole Savannah River panoply of issues that stretch all across the country when it comes to waste management, for example.

They will give me a first cut at this about 10 days from now. By the middle of April, I hope to be able to brief the White House and key Members up here on the Hill, including yourself, as to exactly where we stand on that issue. We will pour in the resources necessary to startup safely, with good provisions for environment, safety and health issues, and with due regard to all of the concerns to starting up an old reactor. We will come up with new procedures, new disciplines, new training. I will be working with Westinghouse, the new contractor. I am going to meet with the chief executive officer and the president of Westinghouse here shortly, and we are going to have a good session on exactly what our mission is for this country. It is critical.

They will be working in partnership, but they will have a rather tough overseer in me to make sure that there is no stone left unturned in preparing for that startup. And I think when we do that—and, by the way, it had not been done, in my opinion, when I arrived. I looked at what was done in the way of studies for startup, and they were totally inadequate. We do not have the technical talent that we should have to oversee what the contractor is doing. We will have that.

So we have a lot of work to do, but I am confident that we will get that reactor up and we will get it up safely and properly, with a whole new program down there, in a way of doing business that we should have shifted, at least in 1979 following Three Mile Island, and we did not. The nuclear industry and the private sector got the word, and somehow in defense they did not get the word.

So it is going to be a tough road, but I believe that with the help on the Hill over the funding for the kind of work we are doing, I believe that we can get those reactors up, and that we are not going to run into this need at this point in time to look for alternative sources. But I am not ruling that out. I think you have a good point, and I can guarantee you that some time about midsummer, after the President has had a chance to look at the stockpile memorandum and how it relates to the treating of inventory and what might be squeezed in the pipeline and so forth, that it melded with our startup plans, will give us the information that we need to decide whether there is an alternate source requirement.

I do not believe we need to get too much in that. We are doing some quiet work, as you know, in the background to make sure we have identified those sources. So there is some quiet work we are doing, but I do not think we need to lean on that right now. I am not convinced at all we will have to do that.

Senator EXON. Mr. Secretary, thank you very much.

Senator Domenici.

Senator DOMENICI. Thank you very much, Mr. Chairman.

Mr. Secretary, I have to join the chairman in trying to narrow the issues on the budget, so I am going to have to leave. I apologize for that. I am already 15 minutes late, but I very much wanted to express a couple of things to you. Let me do that rather quickly.

First, from the standpoint of this committee and the appropriations process, we very much need to know as soon as you can tell us whether the President's budget, as amended for environmental cleanup, provides what you will need for these activities in 1990 and 1991. As you know, the estimates ranging from $70 to $200 billion are not dollars that we would be able to spend now in any event. We only have done an inventory, and now we must develop the plans as you have described them in your statement and in your answers. And I understand that the line for expenditures will be very gradual in terms of dollars, and then when you begin to do the work will be very steep in the outyears.

It is also my understanding that the differing estimates as to how much it will cost do not differ greatly in the first 2 years; but, rather, as you get out into the third year and beyond, some estimates are the expenditure line goes up dramatically. But we need to know whether you can get the work done for the dollars as estimated by OMB. And I understand that most of that is evaluation, research, planning, and design. Am I right on that?

Secretary WATKINS. Yes, sir, you are, although we will start moving dirt, too, this year. In fact, we are moving it now, as I mentioned in my statement. We are actually moving waste. But your assessment is right. It is my feeling that the 1990 and 1991 estimates are probably the maximum dollars that I can manage at this point in time, as I see it. And until I get my definitized plan, 5-year plan, this fall, I will not really be able to answer that question as nicely as I would like to for you.

So at this point in time, I am satisfied with my predecessor's estimate that when the President added back the $360 million for compliance, for cleanup and so forth, that that was sufficient to do our job in 1990 and 1991 as we carry forward the $360 million.

Senator DOMENICI. Now, my second concern is that we had already undertaken in a rather systematic way the modernization of facilities separate and distinct from the new inventory that the last Secretary did on cleanup needs. I surely hope that you carefully assess that, because I believe it would be a shame if, in the effort to clean up, we did not continue—or put it another way, we greatly debilitated the ongoing efforts to modernize. I think we must continue those, and I hope you have had a chance to at least be able to assure us that you are not going to sacrifice modernization, but, rather, try to continue it on.

Secretary WATKINS. Exactly, Senator Domenici. We are in complete agreement on that. In fact, I think one of the Senators mentioned earlier in our discussions on this very issue that the modernization actually leans towards a cleaner system. And so the modernization becomes very important as a part of the effective cleanup concept for the longer haul in terms of the new production reactors, for example, or the SIS facility at Idaho, or the kinds of things we are doing to deal with the transuranic wastes at WIPP.

All of these things are integrated; all of them are important. And I have reviewed the priorities, and it seems to me they make eminent sense at this point in time.

Senator DOMENICI. My last question includes an observation. I already said at your confirmation hearing that I think your job, from the quality standpoint, is to maintain the confidence of the American people. With your background, skills and character, if you can maintain a high degree of credibility and confidence, you will have a chance of helping this Nation immeasurably. Most nuclear-related facilities lacks credibility, because it is very difficult to maintain it for a frightening and greatly misunderstood concept.

Having said that, I hope that you would agree with me that there is no greater inventory of expertise in the areas of technology development, expertise in addressing the research issues involved in this cleanup and safety program, including finding the best and the cheapest way to do it, than our National Laboratories. I hope that you will avail yourselves of their expertise. I frankly believe we have no idea yet as to what technology is best, and I believe they are as expert as any and pooled in terms of their resource. And I hope that you will make an effort to use them.

Secretary **Watkins**. I will, Senator. I can guarantee you that they will be involved with me in reviewing our restart plan for Savannah River, and they will be involved with me in developing the 5-year plan to clean up the radioactive waste problem in the Nation.

Senator **Domenici**. Mr. Chairman, I would ask permission of the committee to insert the testimony of Robert Traylor, whom we wanted to have appear on the next panel but could not because of time.

Senator **Exon**. Without objection, that is so ordered. It will be inserted in the record at the appropriate time. Thank you, Senator Domenici.[1]

Senator Bond.

Senator **Bond**. Thank you, Mr. Chairman.

Admiral, I am very much encouraged by your testimony about the cleanup of both DOE civilian and defense waste facilities. Your commitment to a thorough and practical approach is clear, and I applaud you for it.

As you probably know, there are several sites in the State of Missouri which need attention, and I would be interested in knowing your thoughts about them. One of the highest priority sites, as we see it, is Weldon Spring, an old uranium processing plant which was operated by the former Atomic Energy Commission in the 1950's and 1960's. In 1966, the AEC ceased its operations and left the plant. It sat abandoned and deteriorating for 20 years until the Department of Energy finally began to clean it up in 1986 under the Surplus Facilities Management Program.

The cleanup process is complex because the facility is so large, and it is contaminated by several different types of radioactive and hazardous waste. The site's size and complexity also mean that it will take almost a decade to complete the cleanup, the target date being 1998. However, we are very grateful that after so many years of neglect, this public health hazard is finally being addressed.

As you well know and already referred to, the Reagan administration's budget did recommend a cut of $13 million in funding for the Surplus Facilities Program. Because Weldon Spring is the largest project in the program, its funds would be reduced by $6.5 million. In addition, funding for the following years is cut by even greater amounts.

Reductions of this magnitude would be both harmful and shortsighted, in my view: harmful because of the pressing need to clean up the site, and shortsighted because the cleanup process is ongoing, it promises to be successful, and further delay is only going to be more expensive.

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[1] See p. 297.

Stated another way, Mr. Secretary, funding reductions would result in a doubling of the Government's total cleanup costs over a long period from $400 million to $800 million, and a doubling of the length of time it would take to complete the project, from 12 years to 24 years. That would put completion at about 2010. It hardly seems fair for the neighbors of this site to be forced to wait until the next century for the Government to take care of a problem which it created in this one.

I would appreciate your comments on that, Mr. Secretary.

Secretary WATKINS. Senator, I am very sympathetic with the stretchout problem, and I think it is not just at Weldon Spring. It is at a number of places. One of the things I am trying to do in this entire 5-year program, is to where we go into the characterization and the prioritization of each site; Weldon Spring is going to be one of those, clearly. We are going to have to place Weldon Spring in the priority and context with the overall problem that we have in the Nation.

Now, we do have moneys going into Weldon Spring. I think you mentioned it is $9.4 million in fiscal year 1990, and a stretchout. I am not so sure where Weldon Spring will end up in the priority, but I can guarantee you it is not being casually treated. It certainly will not be casually treated by me, either there or at the St. Louis airport site, and I think you have one other site in Missouri, the Kansas City plant.

So they are clearly going to be line items in our budget submission for 1991 that we can watch and put into the context of what we have to do nationally. We have some severe problems nationally, and I have to look at each one of these.

Now, I have reviewed what is going to happen in 1989 at Weldon Spring, and at least we have got a good start. We are going to know pretty much where we stand. So we are one up, you might say, on characterization and ability to inject Weldon Spring, along with the other two sites in Missouri, into our overall 5-year plan. I would ask that you wait for me to look at that, because it will help us not only for the 1991 budget, but it will help us make sure we focus the dollars in the 1990 budget that are available to the right spots, so that we start executing a plan that is already at least in draft form within the 5-year plan that we have for the Nation as a whole, as we allocate the 1990 dollars to cleanup.

That is all I can say at this point. I am sensitive to the fact that we have stretched out the project. I do not like it either, but I am stretching out a lot of things at this point in time while we get our arms around this. And I am not sure that we will not bounce back. It depends on where the Missouri sites, the three sites that I mentioned, are going to rack up in the total priorities. I hope we can convince you and other members that we are doing the very best we can within the allocations. We may have to ramp up later on once we see how the whole national picture looks, including our longer-range projection to clean up at the maximum rate fiscally possible.

Senator BOND. Well, I appreciate that, Admiral. I look forward to working with you to ensure that the cleanup moves forward, and we may need to put some of these sites put on a faster track. I will certainly do what I can to get you the resources available.

I would suggest that our State Department of Natural Resources, with which I used to have a very close and even closer working relationship than I do now, has done extensive work there and can provide you with resources. You have mentioned the other sites in Missouri, such as the Allied Signal plant in Kansas City, which was part of the nuclear weapons complex. It has several problems relating to hazardous waste disposal and ground water protection.

We do have some problems, but we have done some work on them. We understand the need to prioritize, but we want you to know that we are willing, as a congressional delegation, to see that we get a priority rating for these sites.

Mr. Chairman, I have some other questions I would like to submit for the record.

Secretary WATKINS. We will get with your State regulatory agency. I mentioned that in my response to an earlier question on the details of our cleanup. We will have them involved with us in the review of our planning priorities.

It may well be that you have certain priority contaminants there that we have to get out right away, and others are going to have to sit there for the 24 years, if, in fact, they are not really going to hurt anybody; if, in fact, we do not have the dollars to get it out of there. We want to get all of the contaminants out, obviously. But we will do the best we can to involve the State of Missouri in our planning process and make sure that they are at least understanding of the priority regime that we come up with on the three Missouri sites.

Senator EXON. Thank you, Senator Bond. The questions that you wish to submit for the record are accepted, and we would ask that the Secretary respond to those as promptly as he can.

[The questions of Senator Bond follow:]

SUBMITTED BY SENATOR BOND

Mr. Secretary, could you give me the status of the cleanup of the other radioactive waste sites located in the St. Louis area? I am particularly interested in the slaps site which is located near the St. Louis airport. What is delaying the cleanup at slaps and why did DOE fail to request the $1.5 million in fiscal year 1990 funding needed to conduct feasibility studies for the site?

Senator EXON. We will begin our second round now. Senator Symms?

Senator SYMMS. Mr. Chairman, thank you.

I am going to ask a question, Admiral, on behalf of our colleague, Senator Armstrong, who could not be here. I will read the question so that I ask it in the fashion that he wants. But I do believe in looking at the question it is somewhat similar to the question that I asked earlier that I believe all Senators are interested in, because it deals with the problem of perception and reality and the difficulty therein.

I quote: "The 2010 report stated that the production facilities at Colorado's Rocky Flats Plant should be moved to Idaho. As I remember, the primary reason cited was the difficulty created by public perceptions of risk rather than actual risk. Is that true?"

Secretary WATKINS. I really do not have the detailed answer for that. I think we have got both, Senator Symms. I could not separate those out. I think we have real risks, without any question, at Rocky Flats. Probably because of those real risks, we have others that are more perceived. Because once we get into the deficit situation that we are in now, we have so little credibility that it is hard for me to try to define the difference. We have got to start removing some variables, and then I think we can begin to say whether or not it is perceived or real.

Senator SYMMS. Well, I think that the basic thrust of what Senator Armstrong is trying to get at is: How do we fix the perception problem? And to further state it, many of the perceptions of risk do not match the actual risk figures provided by the Department of Energy's many experts. What plan does DOE have to help bring the public's perceptions of risk back in line with the actual risk figures produced by the Department of Energy?

Secretary WATKINS. Well, I think my answer to the question of what I am doing in the entire waste management business to bring ourselves up in terms of credibility, both in the technical talent we are bringing in and the plan we have, the aggressive plan, the involvement of State regulatory and other agencies, will probably help more than anything else to regain lost credibility, and the work with the State officials to make sure that we are in synchronism with each other. There is no reason for us to be out of synchronism, and we are today. So I accept some of the complaints.

I have met with the Governor of Colorado, and we have chatted very, very directly and in a very productive way with each other. So we are well on board with each other on this issue. I believe the credibility will come back, Senator Symms, if I can have a little time to build a system that somebody can look at and say that it makes sense. Right now there is no such system.

Senator SYMMS. I want to concur with what you said. I think your command of this situation is going to go a long way toward clarifying perception and credibility. I happen to think that we do a lot of things very well at INEL, and I agree with what Chairman Sasser said when he invited you to Oak Ridge.

I know you have a large agenda, but when you get the opportunity, I think it would be very helpful if you could visit Rocky Flats and could come to Idaho and visit our transuranic waste site. I know you have been there before, as you obviously trained there, but I think that it would be helpful to those in the field as well as the general public to understand that you are on top of this situation. It really is something that technologically we can handle.

This is a political problem of incredible magnitude, as we have seen how public opinion can be swayed by emotional charges. This not only happens with the nuclear industry, but it also is present in our food industries, as we have witnessed in recent weeks, all to great expense to our country and its people. In this case, our national security is even in jeopardy if this problem between Rocky Flats, Idaho, and the WIPP facility in New Mexico, is not resolved. I want to work with you to solve this problem and to bring about a reasonable, rational solution.

I totally agree with what you said in your answer to the last question. I think you are on the right track to prioritize the big problems and then address these concerns, starting with highest risk areas subsequently working on down the list. If we can implement your plan, I think the American people will feel much better about what we are doing.

I want to compliment you for your statements here this morning and your grasp of the issues. I think, for as short a time as you have been in charge at the Department of Energy, you are on the right track and headed in the right direction. I wish you well.

Secretary WATKINS. Thank you, Senator. I will be visiting Idaho. I am going to follow the waste route, if you will. I have a lot of places to visit. I did not want to get out there in the public view until certainly I was approved by the Senate, but, more importantly, until I had something to say. And I think I am getting to the point, I am close to the point where I have something to say. I believe when I get my arms around the Savannah River situation, so that I feel comfortable that I can link it with the waste management issue, which I am beginning to see now, then I have something to say.

I have talked to Governor Andrus, for example, in Idaho at some length. We met twice. He, again, has been very helpful. He understands the national security issues here, but he has problems out there. And I am very sympathetic with those problems. And I think that by meeting with Governor Roemer and Celeste of Ohio—I have not met Governor Carruthers of New Mexico yet, but I will be doing that as we move through the WIPP legislation process—I believe that I can help establish that credibility, on the one-on-one basis with the Governors, with the other responsible representatives there, and with you over here on the Hill. When I go out there, I will let you know that I am going. I am going to be going out fairly soon, I would say within about 4 weeks, because I will have something to say publicly then.

I think it is very important to calm the waters, much as we did in the AIDS Commission. We took a lot of hits first because we were in sad shape. But after we began to get our feet on the ground, with our first report to the President, we began to calm the Nation down because we were on the tube a lot. These good people from C-Span and others put us on there enough so the American people began to see that this country is in pretty good shape.

You know, we have a technical capability of which we ought to be proud. Why can't we manage waste? France has been able to do it, Germany, Japan. What is wrong with us? We can do it. So let us get on it.

My feeling is we are on the verge of doing that in the Nation today. We saw such silly problems at Shoreham, where we have a plant at 5 percent power about to be licensed by the Nuclear Regulatory Commission, with some people wanting to shut it down and dismantle it. This is crazy, as long as we have a proper evacuation plan and we followed all the rules of the game in licensing and so forth.

So we have to turn all of that around, and waste management is a large portion of it. Unfortunately, we have let it come this far. But it may well be the catalyst to get this Nation to understand what we have got to do, both for national security and for energy needs of the Nation.

Senator **Symms**. Thank you very much, Secretary Watkins and thank you, Mr. Chairman.

Senator **Exon**. Thank you, Senator.

Senator Grassley has joined us. Senator Grassley, we completed the first round. We are on the second round. But since you have not had a round, I would be glad to yield to you at this time, if you care to ask questions.

Senator **Grassley**. Would you give me some time? You go ahead.

Senator **Exon**. Certainly. I will proceed.

Senator **Grassley**. Thank you very much.

Senator **Exon**. Thank you very much, Senator Grassley, and thank you, Senator Symms, for your input and good questions.

Mr. Secretary, in your remarks previously, you said something to the effect that while private industry recognized the problem, I think you said something to the effect that defense did not get the word. It is pretty obvious.

In last year's budget, you know, over a year ago now, I remember we were talking about this problem, and it had not made the headlines all over America yet at that time. And we had, I believe, $120 million only in the budget at that time.

In the authorizing process in the Armed Services Committee and the Strategic Subcommittee, I found $50 million that everybody wanted to use for everything else. And I had to fight to get that finally put in the authorization that came out of the Armed Services Committee. So we increased the recommended administration level of $120 million up to $170 million. A tiny step but a significant step in the right direction. Eventually, if I remember right, the Appropriations Committee cut that to $160 million, but yet we had some money.

Would you just say once again, given the caveat that you put in that you were going to be coming back here to tell us what you think we need, do you believe that given last year's appropriation of $160 million and what we are presently talking about, that that is sufficient money that you know now that you think should be provided in this area? Of course, I am talking about cleanup.

Secretary **Watkins**. Yes, sir. Last year's budget figure of $160 million has now been escalated to $401 million in this budget. I think that is a significant increase and probably is close to the mark. If I can believe my predecessor and the good people that have worked these budget figures up, this looks like the figure we need to manage the program. It is part of the dollars that President Bush has put back in to help us in a variety of ways, some of which, of course, is directly allocated to the Savannah River startup and safety compliance.

Senator **Exon**. You would not hesitate to come back up and tell us if you were convinced that you could use constructively additional funds.

Secretary **Watkins**. Yes, sir, I will, and I think that I will know when I see a more detailed layout of the variety of issues that we need to address for safe startup of those reactors. So I hope that we can do it within the funds somewhere in the system. If there is any reprogramming that may be necessary for 1989, I would hope to be able to come up with it. I do not see it right now, but I have not seen the detailed plans. We may have to work with the contractor to see if he is doing enough in the area of training and personnel, for example. We do not have a simulator down there that can simulate the casualty procedures that are necessary to train people on the simulator. Why we do not have the software, I do not know.

These are the kinds of things that we are finding as we look into the ground truth, as I have called it in my other testimony—what is really going on down there as opposed to what people tell me is going on down there. That may require extra resources, both in full-time equivalents and dollars. But I am not ready to ask for that now.

Senator EXON. We are glad that you are on top of the situation. I think we are all convinced that you are.

I was also very pleased to see your overall attitude about keeping us informed up here, especially those of us who are intricately involved in this from a national policy standpoint, as is this Senator, and also the individual concerns of many Senators, which are very legitimate in their own States. Also, I appreciate and salute you for the fact that you are going out into the field to see the Governors because we certainly need their help and understanding. And I agree that my good friend Cec Anders has his hands full out there, and I have always found him to be an extremely reasonable individual that does understand the concerns of national defense. I think he will be helpful wherever he can, and I salute you for that.

That leads me to the question that I indicated I was going to ask you when my second round came. I may be wrong, but it seems to me that those who have put the most heat on the Department, through court action or otherwise, are the ones basically that are getting up-front consideration and up-front dollars on the cleanup. While I understand that, I do hope that you will get an early handle on what the priorities are and start setting priorities rather than responding to those that put the most heat on the Department.

Secretary WATKINS. I will, Senator. I believe that we can come up with this. It is going to be tough to do this in the next few months, but we are going to do it. I think it is so critical to the entire credibility of the Department in a variety of areas. Therefore, I link this cleanup management as probably the key to moving on in an aggressive way with so many of the other programs that we have to deal with, including those that link energy needs with the problems of global warming and the like.

So I think we can handle all of these things. I have got a number of task forces moving in a variety of directions simultaneously, and I do not see any reason why we cannot get the gun on those that feel that I need more oversight. I really do not need that right now.

I hope that you will agree in a few months that I am providing you with so much information, Senator Exon, that you are satisfied I have control over it and it sounds sensible to you. That is what I am hopeful of doing. We do have oversight groups, and I believe in the nuclear business you have to have oversight. I do not have any problem with it. But I cannot run the Department with oversight committees alone. I have got to get the line management organized, and unfortunately, they are the same caliber of people we talked of earlier. There are not many in the Nation. So if we have 14 oversight committees, all of whom have 100 people on the staff, that is what I need to run the line management so I do not need oversight.

Somehow, we have to find that balance, and I do not blame the Congress because I think the Congress has been devastated by the lack of openness and forthrightness on telling you what is going on. So I can understand the response to that is to try to get control. On the other hand, I think we are at the point now where I would like to just be given a chance to let you know what I am doing. Hopefully, we can avoid establishing a lot more oversight committees, some of which are bubbling along right now for this session of Congress.

Senator EXON. You indicated the 5-year program, with regards to coming back and telling us what we have to do, when we have to do it, and not being bashful about what you think are legitimate requests, could I ask you to specify a little bit further what are your plans on the other side with regards to the modernization of our present facilities, including the two options that we approved last year for dual consideration, both for a new facility heavy-water at Savannah River, and the new gas procedures in the State of Idaho? When do you expect to make a decision on timing and the amount of funds that are necessary to move ahead on either one or both of these modernization programs that we have agreed to?

Secretary WATKINS. Well, we are moving along right now, Senator Exon. In fiscal year 1990, we have $303.5 million dedicated to the new production reactors, some of which is for conceptual design in preparation, for construction and so we are aggressively going after the dual track mode.

As far as the heavy water reactor at Savannah River, we have $41.5 million in R&D for fiscal year 1990. As you know, the total cost of those two reactors are estimated in fiscal year 1988 dollars to be about $6.8 billion, total.

One of the things I am going to do is establish a very special R&D oversight capability in my own organization to monitor the progress on that. We will get the key milestones, let you know what the risks are as we get into the detail of the heavy-water design and the modular high-temperature gas-cooled reactor design issues. Those milestones will be looked at very critically by me and the technical groups and, of course, we will come to the Hill and let you know how we are proceeding, what the outlook will be, are we achieving the milestones, are we getting over the long poles in the tent in R&D, and so forth.

So, the dollars allocated right now, in my opinion, are quite adequate and beginning to ramp up significantly, as we get into this high-cost investment for the two reactors. So, I think that is moving along well. I have not had the detailed briefing I need on either of those two programs, but I have had enough to indicate to me that at least we are starting out on fairly good ground, and I will have an Idaho National Engineering Lab special group reporting to me so that we will get our arms around the startup down there, and also take a hard look at what we are doing to link the start-up and the life of the existing reactors with the new production reactor schedule. Then I will have a better feel and I will keep you advised of how we are doing.

Senator EXON. Thank you. I have one more question for the record, and then I will have some others that I would like to submit for you to respond when you can and when you do not have anything else to do. [Laughter.]

I expect that you do not know the answer to this question, but I think it is one that we had better look into. I was startled to read an article recently that said that we have no overflight restrictions at Savannah River or any of our other Department of Energy facilities in this area. We have a very elaborate or quite elaborate ground security, but practically no oversight responsibility as far as radar protecting that facility from an attack from a terrorist or anything else, and that even goes, as I understand it, to some of our best labs, some of which have been mentioned here this morning.

If that is true, it seems to me that that is a terrible oversight and it is something that we should look into. Evidently the Federal Aviation Administration has been less than forthright in this area. Was that article wrong that I read?

Secretary WATKINS. No, the article I think was right, Senator Exon. This is an area that I have been getting into, the whole area of security of our facilities—security of our electrical distribution systems, security of our oil supplies, security of our facilities. We used to have it at Savannah River. It was removed by the FAA, and so we are in the process of reestablishing it, but not just at Savannah River. We have got to take a look all around, and I believe with the new Secretary for Transportation and with my personal friend coming into the FAA, I do not see any problem in getting this reestablished.

Senator EXON. If you have any problems, I am also on the Aviation Subcommittee over on Commerce, and this all links together and I think that, boy, if there is one place where we have really fallen down on what is ABC security, it is in that area.

You know, right now a plane could fly, as I understand it, over any of those facilities at 500 to 2,000 feet if they wanted to, and I am delighted to know that you are on top of it.

Secretary WATKINS. Well, I am not on top of it yet, but it is an issue that I am checking into. We have got a lot to do in that area, Senator. I am glad you brought it up, because it helps me to know of your interest in this kind of thing. It is going to be some time before we get this completely closed, but we will be working on it.

Senator EXON. Thank you.

Senator Grassley?

Senator GRASSLEY. Admiral, it is good to meet you for the first time and to have an opportunity to be with you.

Let me say in regards to your statement, where you call in your statement for the need for a national energy strategy, an integrated national energy strategy, you did not have any specifics. Could you be somewhat specific in what you would like to see implemented in that area?

Secretary WATKINS. Behind my desk in the office, I have gathered together about a hundred national energy policies. Everybody has a national energy policy, particularly if you come from a particular energy generating constituency, and they all are not bad.

In fact, I think the energy policy established by the Department of Energy, from 1980 to 1988, and the energy security documents sent to the Congress last year, they are good documents.

What we have not been able to develop, Senator Grassley, is an integrated strategy to take those policies and put them into some kind of programmatic language that makes any sense to the Congress or the American people. That is the problem, and that does not mean just the Federal level. That means State and local. So, that is what I am talking about, it is that much more integrated in its concept, that is, energy needs the mix of energy sources in the out-years—what are the probabilities of technical breakthroughs for alternative fuels, how are we going to deal with global warming, how are we going to deal with acid rain, how are we going to deal with toxics. Nonattainment things are all part of that strategy, and they have to be because we have to have them balanced and the economic projections of what they might be. What I am talking about is taking a bunch of policies, some good thoughts that have been talked about up here on the Hill and elsewhere for years, and putting them into some kind of a decent strategy so that when we come up to you with a budget, you can say that it fits in the national energy. We understand what it is, we understand where you are going, we understand it is dynamic, and it is going to be updated as you move down the pike, but at least you have something in the near-term, the mid-term and the long-term you are working towards. That I do not think we have today, and I think it is essential.

Senator GRASSLEY. Out of that pool, then, that involves a process of selection, as well as prioritization, and obviously the elimination of some suggestions as well?

Secretary WATKINS. Yes, sir, clearly it does. I think we get up to certain points in research and development where we cannot give a potentially ineffective new source of energy continued life all on its own, just because we had a hundred people working in some lab somewhere. I think that is always a difficult decision, because it is like a base closure, nobody wants to ever get involved in those discussions. But I have to get in it at some time and say we have reached a point where we have to make a decision and one of these major R&D efforts is going to have to be reduced to a level of effort work.

Senator GRASSLEY. So, you see your leadership in that area more as a procedural one, a process as opposed to necessarily the substance?

Secretary WATKINS. Well, I think it is very substantive, because I think it is going to affect dollar submissions, it is going to affect the degree of coordination between the executive and legislative branches on energy issues, it is going be a very thorny path. As I mentioned in my confirmation hearings, I do not see how we can make everybody equally happy. I think we can make everybody equally unhappy, and that is a very different kind of a picture, where we all have to share a little bit of the burden between high-sulfur coal and low-sulfur coal, the degree to which oil and gas are going to be playing a role, and where the regulatory obstacles to progress to bring the Nation together in a more harmonious path, as we face these seemingly intractable issues of environment versus energy needs.

This oil import thing is an incentive for us to get our act together in terms of a national energy strategy. So is the waste issue, so is the opening of ANWAR and the reserve up in Alaska. So, all of these things now have to be integrated, or I do not see how we are going to get the Congress to agree that what we are doing makes any sense, because if we look at each individual item and try to solve the problem that way, we may be stepping right on the toes of the other argument that says, hey, you are putting too much CO_2 in the environment and you are contributing to global warming.

Senator GRASSLEY. Could I go on to another point. Could you give us minimum safety requirements that must be met before production reactors are restarted at Hanford and Savannah River? Minimum standards, I am not sure that if you have got to list 50 things for me right now, I want those listed, but is there a number, do you have a list of things that need to be done?

Secretary WATKINS. There are dollars in the fiscal year 1990 budget, Senator Grassley, to take a look at the N reactor restart in terms of what is necessary, there are enough dollars in there to see what is necessary for restart, to put it on a three-year program. In other words, if we decided today——

Senator GRASSLEY. We do not that——

Secretary WATKINS. I cannot answer that, but I am not sure the system does not have somewhere in it the details of what would be needed to meet the safety requirements for restart, but there are so many other considerations. We know that the life of the core, for example, is 5 years after we start, we know how many billions it will cost to get it back on the line. I am not sure it is one of the great viable options right now that I need to devote a lot of time to, because right now I think it is pretty much in limbo and on a 3-year standby, with some work going on.

Senator GRASSLEY. Is it possible that some locations at some Department of Energy sites may be irreversibly contaminated? If that is the case, how do you intend to deal with it?

Secretary WATKINS. Let me ask the Under Secretary to address that issue, because I do not have the answer, but I think she does, Senator.

Senator GRASSLEY. OK.

Miss FITZPATRICK. Senator, in our assessments of the needs for cleanup across the Department's facilities, we have concluded, always subject to further examination, that there may well be some of our sites that cannot be cleaned up in the sense that you would then want to build a school on top of them. They should be stabilized in place, that is the dirt and other things should not be removed any place, they should be stabilized in place and secured, and that of course is subject, as the Admiral has described, to our ongoing characterizations and also the development of new technologies which could possibly allow us to do things that do not seem to be feasible with today's technologies.

Senator GRASSLEY. Mr. Chairman, I would like permission for two questions for answer in writing.[1]

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[1] See p. 326.

Senator **Robb**. Those will be submitted and we will ask the Secretary to respond in writing to those particular questions.

Secretary **Watkins**. I would be pleased to do that, Senator Grassley.

Senator **Robb**. Thank you, Senator Grassley.

Senator **Grassley**. Thank you.

Senator **Robb**. Senator Symms, did you have any questions on the second round?

Senator **Symms**. I just have one last question, Mr. Chairman. How comfortable would the DOD and the DOE be in relying on our allies for vital nuclear weapons material?

Secretary **Watkins**. I can give you a personal opinion on that.

Senator **Symms**. I would like your personal opinion.

Secretary **Watkins**. I cannot express an opinion from the Department of Defense. I think it would be extremely unwise for this country to get itself in the position where we are relying on the Soviet Union, as we are today, to bring in some of our enriched uranium ore. I do not understand that.

It is hard for me to understand it, as a military person, and that is obviously for commercial reactor purposes. Nevertheless, it seems to me that our nuclear materials, which are so necessary for a deterrent, should be something that this country ought to be proud that it took the lead on initially and, therefore, we should be generating them at cost-effective rates, which we are not doing today, as you know. One of our attempts in the budget here, on just uranium enrichment alone, is to propose that we move into a privatization regime that has en route a government corporation, and with that give them the new technology called atomic vapor laser isotope separation, AVLIS, give them that capability, because that will reduce the cost by 50 percent, if we can bring it on line properly and get this Nation back in the business of being the lead in the world on generating enriched uranium.

So these are the kinds of things I think we have to do. I think it would be a tragedy for this Nation to say we must import tritium from France, for example, that can generate tritium at very, very steep prices. Is that something this Nation wants to be proud of? I do not think so. I think we need to move aggressively in these other areas to insure that we can protect our own deterrent and that we have the strength, otherwise we do not know what those lifelines would be and we do not know what quid would be involved in maintaining a lifeline like that.

We know that some nations have laws that preclude the sale of their tritium, for example, to us and we are using 235 grams a year in things like tritium lights and the nondefense related areas today. Even so, many nations would not even sell us the tritium because of nuclear proliferation issues, which we are all sensitive to. So, I think it would be a tragic mistake for us to not move aggressively in making sure we have the resources right in this country to do the job for our nuclear deterrent.

Senator **Symms**. Thank you very much, Admiral. I would just say to you that on behalf of my State, I am trying to convince my constituents that they should not in any way be anything less than proud of the fact that we nearly have the capability to reprocess plutonium and make tritium in Idaho. After all, this capability has preserved peace and freedom for the last 45 years, and I think it is something that each American can be proud of.

I agree you, as a nonmilitary person, that it would be pathologically irrational for this country to rely on foreign sources for the basic deterrent that has been the cornerstone of the peace through strength initiatives, which obviously are working. As I said earlier today and yesterday, we are winning the battle of ideas in the world. People are moving toward capitalism and freedom, and away from communism and oppression. In order to be sure that this continues, we have got to stay the course in the upcoming years. In the end we may end up winning the cold war for good. In the meantime, we simply cannot take risks.

I thank you and the able people that are with you here this morning for an excellent presentation. Again, we will be looking forward to working with you.

Secretary **Watkins**. Thank you, Senator.

Senator **Symms**. Thank you, Mr. Chairman.

Senator **Robb**. Thank you, Senator Symms.

Mr. Secretary, to you and the Under Secretary and your Assistant, thank you for your appearance this morning. I do not know whether any explanation has been formally offered for some of the changes that have taken place here on the panel, but there is a hearing taking place at the White House that involves some of the senior members who are hopefully doing the business that we all hope needs to be accomplished at this particular time. I apologize for that change.

That would complete your testimony. We thank you. If there are any additional submissions you would like to make for the record, they would be received with pleasure and I am sure the members of the committee will get back to you individually.

Secretary **Watkins**. Thank you, Mr. Chairman. We appreciate the chance to be with you this morning.

Senator **Robb**. Thank you.

We will ask the next panel of witnesses to please take their seats, so that we can proceed. Let me again make a brief comment prior to beginning this particular panel session, and apologize for the fact that some of the other members had to depart. I was over participating in a Foreign Relations confirmation hearing on Mr. Eagleberger's nomination asked to come over and take the Chair for this particular portion. I had thought that if there were an opportunity to really work on the budget and make some decisions that Senator Symms and I could make in the absence of some of the senior members of the panel, that we would proceed with dispatch, but I suspect that that would not be ratified later on, so we will continue on the assigned course.

Senator **Symms**. Mr. Chairman, I think that if we just could say that this is a quorum, we could probably pass it within a few minutes. [Laughter.]

Senator **Robb**. I think it is fair to say that both of us have some thoughts that would contribute to that process. Nonetheless, I apologize for the fact that you are dealing with those who are not prepared to interrogate you at great length this morning, because we were concentrating on other matters. As you know, everything that is said here will be made a matter of record and will be utilized by this committee and by others in the Congress in making decisions that affect some of the things that we are talking about this morning.

Specifically, we welcome the panel of witnesses for this particular program. I am pleased to introduce at this point Mr. J. Dexter Peach, who is Assistant Comptroller General of the General Accounting Office, substituting—I think some of the lists had Mr. Keith Fultz, who was to testify originally, we have the boss man here himself to provide that testimony, and we are pleased to have you with us, Mr. Peach.

Mr. PEACH. Thank you.

Senator ROBB. We have Mr. Robert Barker, Assistant Secretary of Defense for Atomic Weapons, and Mr. David Culp, Legislative Coordinator of the Plutonium Challenge.

Welcome, one and all, to the Budget Committee. We look forward to your comments on modernization and cleanup problems at DOE's nuclear weapons complex.

I would let you know that there is a planned vote, I am not sure quite what time it is going to occur, on the Senate floor, so we would ask you, to the extent that you can, to summarize and keep your testimony as brief as possible. Certainly, your entire submissions will be placed in the record and be available for study by all the members of this committee.

To begin, Mr. Peach, we will ask that you begin the proceedings at this time.

STATEMENT OF J. DEXTER PEACH, ASSISTANT COMPTROLLER GENERAL, GENERAL ACCOUNTING OFFICE

Mr. PEACH. Thank you, Mr. Chairman.

I would like to start off by saying I know the Comptroller General has appeared before the Budget Committee on a number of relevant and important issues regarding the budget, so we certainly appreciate the other types of discussions which are going on today and their importance.

Let me start off by saying, having had an opportunity to listen to Admiral Watkins, I would like to get my entire statement put in the record and then proceed to summarize some observations.

Senator ROBB. It will all be placed in the record.[1]

Mr. PEACH. I think one thing that is certainly refreshing, based on the work that we have done in the area, is both the interest and the emphasis that the admiral is bringing to this area in his new role as Secretary and also the balance that he presents in his remarks in terms of trying to address both what is needed to be done in the production area, as well as to deal with the safety and environmental problems.

We at the General Accounting Office, have issued some 50 reports regarding safety and the environmental problems at the weapons complex, going back to the early 1980's. Those reports detail a history of unresolved safety and environmental and operational problems. They related to the operation of reactors, the deterioration of buildings and equipment, thereby giving rise to safety and operational problems and groundwater and soil contamination, which often went to hundreds of thousand times above standards. And it is those types of problems which have led to the situation where we do not have any reactors producing weapons material at this point in time, and where we are talking about cost of cleaning up and modernizing the complex of $155 billion.

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[1] See p. 248.

The reasons that we need to be talking about this is an overemphasis on production, in attention and neglect in the environmental area, and complacency on safety matters. DOE did recently furnish its plan for revitalizing the complex, with modernization activities to be completed by the year 2010, and a revitalized complex in place, but with many problems in the environmental area remaining.

One of the things we felt that plan did not address adequately was the cleanup and decontamination of facilities. I was pleased to hear the Secretary say in his remarks today, for example, that he now has under way a method to map out a 5-year plan, trying to get his hands around the entire problem, trying to map out priorities in this area, and trying to understand what the ramping up of expenditures will need to be, and not taking as a given that we will just go on sort of a linear progression of the amounts of money that should be put in the budget to deal with this problem.

If you look at the cost estimates in that plan, they talked about $81 billion for modernization and environmental restoration, and they talked about $29 billion for environmental cleanup, although the recognition was the cost in that area could be over $60 billion.

One of the things we all have to remember is that these estimates are not budget quality, but just serve to illustrate the magnitude of the problems, and as more information is gathered, we believe it is possible the final cost could be higher. For example, they still have ongoing safety analysis reviews, which may define further safety problems that need to be addressed. The environmental problems are not completely defined, and they also have not agreed upon the cleanup procedures in a number of areas, and we think there is potential for some escalation of cost as a result.

There was a good deal of discussion about the budget and what has been added in that budget. The environmental cleanup area was focused on particularly, when the Secretary mentioned the level of $400 million, and that is a level to be spent on the problem that they have talked about could cost over $60 billion.

Still, with having said that, we would emphasize that you do have to look carefully at how much additional money you could put into this area and how soon you could put it there. They are still very much in the process of characterizing the scope of the environmental problem, and we want to be able to spend funds that we put into that area in an effective and an efficient manner. You need the kind of plan the Secretary has talked about, which maps out priorities and gets agreement on the types of cleanup approaches we are going to take, to make sure we can spend the money effectively. And while we are still on the characterization, I would like to note that some people have talked about adding considerable more sums into that area. There is a question as to how much you can add and spend effectively at this point, and that is something that has to be very carefully looked at.

If I would summarize our observations, we have talked about the cost up to a high range of $155 billion, and the 1990 request is small in relation to that total cost, but there is this issue as to how quickly you can ramp up.

From the national security perspective, it is clear there is a need to produce the critical nuclear material for weapons. We do not now have any plants that are producing tritium. We need to begin to address those problems so we do not run into a serious situation in terms of a production capability.

From the environmental perspective, we have widespread contamination through neglect that has been going on, ranging from the fifties, sixties, seventies, on up. Some of that contamination has spread offsite, and could affect the public, and due to lack of existing technology some sites may be irreversibly contaminated and may have to be placed in long-term institutional care.

One of the last questions asked of the Secretary that was answered by the Under Secretary related to that area. Perhaps there may be new technologies that come along, but at least from some of the areas we have observed, some of the information we have seen, you do have areas that may be irreversibly contaminated and will require long-term care, unless we develop some new or different methods of clean up.

The decisions about the complex are going to be ongoing before the Congress for years. The point that we have made in our testimony this year is the need for DOE to continue to work in updating that modernization plan, giving more clear cost estimates on the major facilities and how those costs will ramp up in the modernization area, and giving more clear estimates regarding what the plan is in the environmental area and how they propose to set priorities for that cleanup.

The Secretary has alluded to putting in place those types of 5-year planning exercises, and we think those are the types of things that need to be done.

Some discussion here this morning was about the restart of the existing reactors. We have work under way, pursuant to congressional request, both looking at the new production reactor decisions and both looking at requirements for material. We hope to have the results of that later in the year. We think there will be issues that will need to be addressed later in the year regarding just where they stand with the safety implementation that they need to bring into being down at Savannah River. These issues must be measured against the kind of information available on what our need is for nuclear material and what is driving as early a restart as possible. We think we will need to focus on those issues towards the end of the year.

That concludes my statement, Mr. Chairman, and I would be pleased to respond to your questions.

Senator ROBB. Thank you very much, Mr. Peach. We will reserve for questions until the other members of the panel have had an opportunity to speak.

[The prepared statement of Mr. Peach follows:]

STATEMENT OF J. DEXTER PEACH, ASSISTANT COMPTROLLER GENERAL, GENERAL ACCOUNTING OFFICE

Mr. Chairman and Members of the Committee: We are pleased to provide our views on what is needed to clean up and modernize the Department of Energy's (DOE) nuclear weapons complex. My testimony is based on a large body of work—over 50 reports and testimonies since 1981—that we have completed on the environmental, safety, and health aspects of DOE's nuclear weapons complex. Cleaning up and modernizing the complex will be a formidable task which is estimated to cost up to $155 billion. Let me stress that while cost estimates are not budget quality, they do serve to illustrate the magnitude of the problems within the complex. As more information is gathered, indications are that the final cost could be higher.

In previous congressional testimony, we have used the problems in DOE's nuclear weapons complex as an example of how we have not invested wisely in key government operations. We have consistently made short-term decisions which now leave us with extremely serious problems that will require long-term solutions with enormous costs. DOE's own studies agree that produciton of nuclear material has been emphasized to the detriment of safety and environmental concerns. They also point out that capital investment to maintain many key components in the complex has averaged less than 2 percent, in contrast to a 4- to 7-percent level normally associated with industrial facilities.

The problems at DOE's complex are so serious that they have at least temporarily shut down key facilities that affect the nation's ability to produce nuclear material for weapons. Dealing effectively with these problems represents one of the major areas of explosive unfunded costs that will have to be dealt with at the same time we address the budget deficit. A comprehensive and well-planned approach to address the problems is overdue, and further delays will only worsen the situation.

In the last session of the Congress, the debate was over whether major problems existed in DOE's nuclear weapons complex. The debate in this session can move from the recognition and acceptance that there are serious problems in the nuclear weapons complex to how to fund and deal with them. The role of this Congress and administration will be to strike a balance between maintaining our national security and protecting the public and the environment, as well as establishing the pace at which the nation moves its weapons complex into the twenty-first century.

The remainder of my testimony provides perspective on (1) the scope and direction of DOE's modernization and cleanup plans, (2) the reasonableness of the cost estimates to implement these plans, and (3) our views on DOE's fiscal year 1990 budget. Before getting into the specifics, I would like to begin with an overview of the complex and its problems.

THE NUCLEAR WEAPONS COMPLEX AND ITS PROBLEMS

Since World War II, nuclear weapons have played a dominant role in the nation's defense strategy. DOE oversees production of weapons at 16 major installations located around the country (see attachment I). The complex's basic mission is to produce nuclear material (e.g., plutonium and tritium) for weapons and naval fuel.

DOE funding requirements for nuclear defense activities in each of the last 3 years have been about $8 billion. In total, the complex represents a public investment of about $100 billion. It includes a wide variety of plants with interrelated purposes, such as nuclear reactors, specialized laboratories, uniquely designed plants for fabricating nuclear material, and nuclear waste facilities.

DOE's nuclear weapons complex, considered in its entirety, is one of the more potentially dangerous industrial operations in the world. The operations routinely use and generate large quantities of a wide range of hazardous and radioactive materials. These materials must be handled, transported, and disposed of carefully by workers not only to prevent exposure to themselves but also to prevent these materials from being released into the environment. Because of lethal levels of radiation and high-level heat generation, many of the materials must be handled with special shielded equipment to prevent worker exposure.

DOE operations also involve controlling nuclear reactions and handling highly fissionable nuclear material. The unfortunate Chernobyl accident demonstrates the more dangerous aspects of controlling nuclear reactions and nuclear material. Finally, DOE operations must be protected against the more commonplace industrial dangers, such as fires or other processing accidents.

GAO's work over the past several years has described a variety of unresolved safety, environmental, and operational problems. Specifically, we have called attention to the following:

Serious safety questions regarding the operation of government production reactors at Savannah River, South Carolina, including the adequacy of the emergency cooling systems and the need for ultrasonic testing to examine the reactor tanks for the possibility of cracks.

The problems at DOE's facilities that result from aging and inattention to capital improvements. For example, some buildings and equipment have deteriorated to the point where they now have safety and operational problems. Furthermore, some equipment and/or processes used within the complex are obsolete, making repair work difficult and spare parts virtually impossible to procure.

Over 3,000 inactive waste sites at DOE facilities—the result of past hazardous and radioactive waste disposal practices—that will require action.

Groundwater and soil contamination at DOE installations around the country, some at levels hundreds to thousands of times above standards. At some locations, such as the Y-12 Plant in Tennessee, environmental contamination has spread offsite.

In March 1987, we pointed out that DOE did not have an adequate plan for addressing the wide-ranging problems it faces and assuring the Congress that it could meet the nation's need for nuclear material for weapons. We called on DOE to develop a strategic plan setting forth (1) the projected facility requirements for an updated nuclear weapons complex; (2) a comprehensive picture of the environmental, safety, and health issues that had to be addressed; and (3) a framework for prioritizing the billions of dollars in federal expenditures needed to remodel or build new facilities, as well as to clean up environmental contamination.

In December 1987, the Congress mandated that the President prepare such a plan to modernize the nuclear weapons complex.[1] DOE delivered that plan to the Congress early this January .[2] While DOE was preparing the plan, more safety and health problems surfaced within the nuclear weapons complex. These problems have resulted in the unanticipated shutdown of key nuclear operations. At present, DOE's reactors at Savannah River, South Carolina, and Hanford, Washington, are shut down. Also, a key plutonium processing building at the Rocky Flats Plant in Colorado was recently shut down for almost 4 months for safety reasons.

Correcting the problems that have been enumerated over the last several years will be difficult. According to the plan DOE recently issued, the entire complex will require extensive modernization over the next 20 years and beyond. The report also states that the costs for environmental restoration will be significant during this modernizaton period. Specifically, the plan calls for additional spending of $81 billion—$52 biilion for modernization and $29 billion for environmental restoration. The plan is an important document because it outlines DOE's current thinking regarding the pace and direction of modernizing and cleaning up the complex.

DOE FOCUSES ON MODERNIZATION

DOE must deal with modernizing its aging complex because of past mistakes—overemphasis on production, inattention in the environmental area, and complacency with regard to safety. While the modernization plan lays out DOE's view of what facilities will be needed in the year 2010 to meet production needs, it does not clearly define what environmental cleanup problems will be resolved during the same time frame.

By 2010, if the plan is followed, DOE will have upgraded many of its plants and constructed two new production reactors and a special isotope separaton facility. It will have largely relocated and/or phased out other installations, such as the Rocky flats Plant in Colorado and Fernald in Ohio. Modernization activities would essentially be completed by 2010, and the nation would have a revitalized weapons complex. However, problems in the environmental area would still be with us. In our opinion, the plan does not adequately address the cleanup of existing facilities and decontamination of facilities as they are retired from service. The plan provides little perspective on how these important problem areas will be solved or what needs to be done in these areas between now and 2010.

While the plan does provide DOE's views on the future configuration of the complex, it is just a first step that raises a series of issues that the Congress will need to consider. For example:

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[1] National Defense Authorization Act for fiscal years 1988-89 (P.L. 100-180, Dec. 4, 1987).

[2] *United States Department of Energy Nuclear Weapons Complex Modernization Report* (Report to the Congress by the President, Dec. 1988).

Should both planned new production reactors be given top priority? DOE's plan calls for two new reactors. Reactors will be built at different sites, and one will use a new technology.

Does DOE have the capability to meet nuclear material needs while the new reactors are being built? Currently, all of DOE's production reactors are shut down. It is unclear to what extent the reactors can be relied upon in the future to produce nuclear material.

Should the special isotope separation facility be a priority activity? DOE's plan places high priority on this project, which is to be used to convert fuel-grade plutonium to weapons-grade plutonium. Given the other planned upgrades of plutonium. Given the other planned upgrades of plutonium facilities within the complex, questions regarding the emphasis placed on this facility need to be addressed.

Are DOE's plans to upgrade facilities that it plans to later phase out appropriate? DOE's plan calls for a number of upgrades at facilities it plans to shut down within several years. The trade-offs between upgrades and eventual shutdown need to be carefully studied.

DOE's plan places modernization on a faster track than environmental cleanup and decontamination. DOE is still studying the extent of contamination at its facilities. Therefore, it has not made key decisions on the extent of environmental cleanup or which sites get cleaned up first. Also, the Congress should consider the issues we have just raised as well as others that may arise in deciding priorities and balancing modernization and cleanup needs. Accordingly, we believe the plan should be viewed only as a first step in establishing a national consensus to rebuild and clean up the complex. We are currently working with a number of congressional committees on many of these issues.

COST ESTIMATES VERY UNCERTAIN

Next, I want to briefly discuss the reasonableness of cost estimates set forth in DOE's modernization report. We have previously reported that the total cost of addressing the major problem areas within the complex is estimated to be up to $155 billion.[3]

The modernization plan's calculation of costs differs from ours in methodology and scope. For example, the DOE modernization report highlights $81 billion for modernization and environmental restoration over the next 21 years. This $81 billion represents the additional funds (an increment) needed during the next 21 years over and beyond funding DOE programs each year at the fiscal year 1989 level of approximately $8 billion. Further, the $81 billion represents costs only through 2010. In the environmental restoration area, DOE recognized that total costs could be greater than $60 billion and would extend beyond 2010. (Attachment II provides a more detailed comparison of DOE's modernization report and the GAO report.)

As I said earlier, it is important to note that all of these estimates are not budget quality and are designed only to approximate the funds needed. In the final analysis, the true cost may be far higher. For example, some of the planned facilities will use new technologies, such as the isotope separation facility and a high-temperature, gas-cooled reactor. DOE's construction of such facilities has been prone to huge cost overruns. Further, many uncertainties exist with regard to how we can clean up existing environmental contamination and decontaminate large nuclear facilities. DOE's modernization plan does not shed much light on what cleanup procedures will be used. Finally, we are not sure that all the problems within the complex have surfaced. For example, in the environmental area, uncertainty still exists not only regarding the size of problems but also regarding the extent to which DOE sites can be cleaned up. Some locations at some DOE sites may be irreversibly contaminated

DOE'S FISCAL YEAR 1990 BUDGET

Next, I would like to briefly discuss DOE's fiscal year 1990 budget request for the complex. The new administration recently amended this request by providing an additional $360 million for environmental, safety, and health activities, so I will be referring to the amended dollar amounts here today. Currently, of the $9.4 billion requested for the complex, approximately $3.7 billion is earmarked for addressing the problems of the complex. According to DOE, this level of support represents the first step toward modernization and cleanup of the nuclear defense complex.

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[3] *Dealing With Major Problem Areas in the Nuclear Defense Complex Expected to Cost Over $100 billion* (GAO/RCED-88-197BR, July 6, 1988).

The $2.7 billion for addressing major problem areas within the complex represents a $1.1 billion, or 42 percent, increase in funding over fiscal year 1989 levels. More specifically, funding for modernization activities has been increased by $471 million to $1.3 billion, which allows for further development of new production reactors and the special isotope separation facility. Funding for environmental compliance and safety and health activities has been increased by $383 million to almost $1.4 billion, and funding for environmental cleanup was increased by $242 million to $401 million. In the fiscal year 1990 budget request, radioactive waste management funding was decreased by $21 million to $575 million. While DOE is requesting increased funding for many problem areas, it is important to note that, given the magnitude of the problems and the enormity of the costs to correct them, the funds represent only a small downpayment on resolving the problem of the complex. This is particularly true in the environmental cleanup area, where DOE plans to spend $401 million on a problem which may cost over $60 billion.

Because of the magnitude of problems facing DOE, and the limited resources available in a deficit era, the budget request will be closely scrutinized. In our view, there are a number of key questions that need to be addressed:

Are DOE's priorities among various modernization and environmental cleanup activities appropriate? Earlier in my testimony, I raised a number of important issues associated with the modernization plan, such as whether both new production reactors should be given a top priority. These issues must be weighed in the budget process against other needs, including safety upgrades of existing facilities and environmental cleanup. Finding the proper balance between these important areas will be difficult.

Is DOE's funding for environmental cleanup sufficient? In view of the magnitude of the environmental problems facing DOE, its fiscal year 1990 budget request is small. Possible increases in funding will likely be discussed in the budget process. We believe any discussion should include consideration of DOE's ability to effectively spend additional environmental cleanup funds in fiscal year 1990.

In order to solve the problems of the complex, DOE must gear up to effectively spend billions of dollars each year not only on modernization, but also on environmental cleanup. Assuring that these funds are effectively spent will be as difficult as finding the funds themselves.

SUMMARY

In summary, the ramifications of the deterioration of our nuclear weapons complex are enormous and raise serious budgetary, national security, and environmental issues.

From a budgetary perspective, estimates to revitalize the complex range as high as $155 billion over the next 20 to 30 years. The budget proposal before you is only a very small downpayment on this enormous bill, and the administration has not provided a funding plan that would show how and when the costs would escalate.

From a national security perspective, our ability to produce critical nuclear material for weapons is virtually nonexistent at this time. If problems affecting reactor operations are not addressed soon, the country's ability to produce and maintain a nuclear weapons arsenal will be in serious jeopardy.

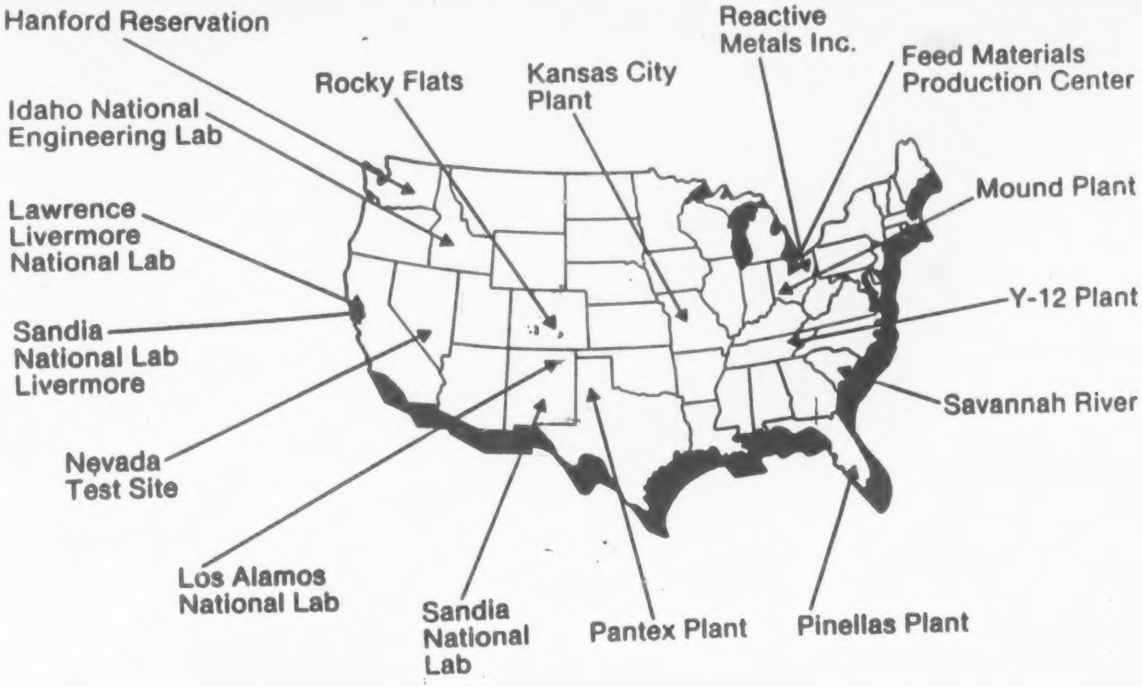
From an environmental perspective, inattention and negligence in complying with environmental laws have contributed to widespread contamination at DOE installations. More ominously, the environmental contamination has spread off-site at some facilities where it could potentially affect the public in surrounding communities. Moreover, some locations at DOE installations may be irreversibly contaminated, and DOE may have to place them in long-term institutional care.

The 2010 modernization plan brings DOE and the Congress to an important crossroad—that of making critical decisions about the balance between restructuring an aging weapons complex to provide new and expanded production capability; ensuring that new and existing facilities meet environmental, safety, and health laws and regulations; and cleaning up the result of years of environmental contamination. The Congress must make these decisions within the framework of the conflicting demands for limited resources necessitated by the budget deficit, while recognizing that the nuclear material from the complex is critical to our national defense.

The 2010 modernization plan is a first step in framing the debate. Today, we have a better understanding of the problems facing the complex. However, DOE is continuing to develop information on the extent of the problems and to address and prioritize what needs to be done to correct them. While all the problems are not yet completely understood, the national debate can now begin to find solutions. Because of the enormous costs associated with the solutions, the Congress will be making decisions about the complex for many years.

Thank you, that concludes my testimony. We would be happy to answer any questions.

GAO Major Sites Within the Nuclear Defense Complex


Hanford Reservation
Idaho National Engineering Lab
Lawrence Livermore National Lab
Sandia National Lab Livermore
Nevada Test Site
Los Alamos National Lab
Rocky Flats
Kansas City Plant
Reactive Metals Inc.
Feed Materials Production Center
Mound Plant
Y-12 Plant
Savannah River
Pinellas Plant
Pantex Plant
Sandia National Lab

ATTACHMENT II—COMPARISON OF GAO's REPORT WITH DOE 2010 MODERNIZATION REPORT

[In billions of dollars]

	Estimate in:		Explanation of major differences
	GAO July report	DOE 2010 report[1]	
Defense complex:			
Upgrading existing capabilities plus modernization.	35–45	44.7	GAO has not had the opportunity to review the supporting documentation to the 2010 study.
Disposal of radioactive waste	30	7.5	DOE's estimate reflects the incremental cost. It does not include costs beyond 2010.
Decontamination	15	4.7	DOE's estimate reflects the incremental cost. Further, it does not include active facilities and does not include costs beyond 2010.
Environmental restoration	35–65	24.1	DOE's estimate does not include all environmental restoration costs nor costs beyond 2010.
Total	115–155	81.0	

[1] Incremental costs represent the additional funds needed during the next 21 years over and beyond funding DOE programs each year at the fiscal year 1989 level.

Senator Robb. Dr. Barker, would you like to give an opening statement?

STATEMENT OF DR. ROBERT B. BARKER, ASSISTANT TO THE SECRETARY OF DEFENSE FOR ATOMIC ENERGY, AND STAFF DIRECTOR, JOINT DOD-DOE NUCLEAR WEAPONS COUNCIL

Dr. Barker. Thank you very much, Senator Robb. What I would like to do is submit my prepared statement for the record.

Senator Robb. We will be pleased to include that in the record.

Dr. Barker. I will summarize it at this time.

I am here representing the Department of Defense. I am the Assistant to the Secretary of Defense for Atomic Energy. I am also the Staff Director of the joint Department of Defense-Department of Energy Nuclear Weapons Council that was established by the Defense Authorization Act of 1987.

Nuclear weapons are a national priority, and as their partners in this area, the Department of Defense annually consults with the Department of Energy in the preparation of the budget that is submitted by the Department of Energy. But we are always very, very conscious of the fact that the Department of Energy is a separate and independent agency. Three Senators of the United States, including two distinguished representatives of this committee—specifically Senators Domenici and Johnston—sent a letter to the Secretary of Defense last March, reminding the Department of Defense that, dating back to the Truman administration, it has been the desire of the Congress to keep atomic defense activities as a responsibility of a civilian agency; namely, the Department of Energy.

The job of the Department of Defense is to describe, to articulate to the Department of Energy what our requirements will be for nuclear weapons in order to provide a sound nuclear deterrent for this Nation.

The presidentially approved nuclear weapons stockpile plan establishes the minimum requirements for the mix and quantities of nuclear weapons and materials. The stockpile plan is prepared annually by the DOD–DOE Nuclear Weapons Council. The Nuclear Weapons Council is chaired by Dr. Cliff Duncan, the Department of

Defense's Director for Research and Engineering. Its other two members are Mr. Troy Wade, the acting Assistant Secretary for Defense Programs at DOE, and General Bob Herres, the Vice-Chairman of the Joint Chiefs of Staff.

Preparation of the stockpile plan begins as a joint undertaking of the Office of the Secretary of Defense, the Joint Chiefs of Staff with contributions from the Commanders-in-Chief worldwide, the Department of Energy, and the Military Services. The Nuclear Weapons Council reviews, approves, and then forwards the plan to the Secretaries of Defense and Energy, who in turn review and refer the document to the President for final approval. Firm military requirements based on realistic threat assessments are integral to the stockpile plan. The process that develops this plan is sound and produces the minimum weapon mix to support the nuclear deterrent element of our national defense strategy.

In keeping with the Nuclear Weapons Council's major role in establishing stockpile requirements, the Nuclear Weapons Council was directly tasked last year by the Secretaries of Defense and Energy, in response to prior tasking by the President and the Congress, to assess nuclear weapon requirements for the next 20 years. This assessment was provided to the DOE Modernization Task Force to be used in developing a production complex modernization plan.

Clearly, to discuss the specifics of the Department of Defense input to this process in detail cannot be done at the level of classification of this hearing. The Nuclear Weapons Council has already this year appeared before the Senate Armed Services Committee, the Senate Committee on Energy and Natural Resources to describe in detail the foundation for the requirements, the nuclear weapons requirements, that are the basis for the Department of Energy's 1990 and 1991 budget request, and for the Department of Energy's modernization plan, often referred to as the 2010 Study, or more formally the "U.S. Department of Energy Nuclear Weapons Complex Modernization Report."

There is no fat in that request. It is the minimum requirement necessary to maintain our nuclear deterrent, and the President's budget for 1990 and 1991 for the Department of Energy's defense program's activities is the minimum necessary to support a credible nuclear deterrent in 1990 and 1991.

The budget has been balanced. The Department of Energy and the Department of Defense have worked together to see to it that the budget request is balanced between Defense and Energy; that is, Defense is asking for the moneys to support the weapon delivery systems for which DOE is being asked to provide the nuclear warheads.

I want to make the rest of my comments largely in the context of the modernization study. The Department of Defense provided, through the Nuclear Weapons Council, to the Department of Energy our best estimate of the 20-year requirement. We see nothing on the immediate horizon that would cause us to believe that there is any diminution in the need to maintain strategic nuclear deterrence for the long term. That is the basis of our input.

Arms control accomplishments may be achieved. If so, when they happen, that will be the time to reexamine the plan. We cannot take unilateral actions today which would diminish our ability to meet an uncertain threat.

At yesterday's hearing, I believe acting Secretary Taft and the Chairman of the Joint Chiefs of Staff made clear that we have to operate on the basis of today's realities, not future promises on the part of the Soviet Union. So our input is based upon what we believe are sound requirements carefully considered in the environment of constrained resources.

The responsive report produced by the Department of Energy, the so-called 2010 study, indeed, we believe, exactly meets the mark. It calls for maintaining a strong, state-of-the-art defense research and testing capability, including the continued need to conduct nuclear tests. It calls for a modernized nuclear weapons production complex capable of producing the nuclear weapons that we need to maintain a credible deterrent. As part of that, it calls for a strong, reliable ability to produce the nuclear materials that we need to make nuclear weapons.

In the context of this operation, it is recognized by the Department of Energy and by the Department of Defense that this whole complex cannot operate unless it can operate safely and in compliance with environmental laws, and provide a safe environment for the people of the United States.

We believe that the budget described to you this morning by Admiral Watkins meets that requirement in the 1990-91 time frame, and we believe that the modernization study lays out at least an initial plan for what must happen in the long haul. Admiral Watkins himself indicated that he wants to examine those details of the long-term plan, and I think that is a wise idea. Ultimately, of course, this long-term solution is going to be a joint product of the executive and legislative branches of Government.

Hopefully, we have learned that we cannot solve these things on a year-by-year basis. We are talking about a long-term commitment, a long-term commitment to modernization, a long-term commitment to environmental cleanup. We have to make it jointly and be prepared to make commitments over a longer term than probably both branches of Government have been willing to do in the past.

I mentioned the fact that a strong research, development, and testing organization is necessary, that a strong production capability is necessary. Let me just spend a few moments emphasizing the need for reliable supply of nuclear material for our nuclear weapons. We will, in fact, be unilaterally disarming if we do not have the capability in this country to provide the tritium, the plutonium and the enriched uranium that is necessary for nuclear weapons. We have what I think most of this committee realizes is a quite fragile complex. For that reason, we need some reserve capability in our ability to produce in each of those areas.

Last year, Secretary Herrington proposed a new production reactor strategy in which he proposed two new reactors: a heavy water reactor potentially at Savannah River, and a modular high temperature gas-cooled reactor in Idaho. Those two reactors will, indeed, if operated at full capacity, product 150 percent of the requirement. That is not the intent. No one intends to produce any more than is necessary, but in the view of the Department of Defense, we needed an assured, reliable supply; and when Secretary Herrington told us the only way he could do that was to have a redundant production capacity, the Department of Defense wholeheartedly endorsed that approach.

Yesterday, acting Secretary Taft and Chairman Crowe were asked personally whether they supported this two-reactor strategy. They emphatically responded yes.

The other two elements of Secretary Herrington's proposal in the tritium area are equally important; that is, we have to get the Savannah River reactors running as rapidly as is safely possible. There is not a moment to lose. As Senator Exon said earlier, I think, we do not want to get into exact dates and times of when the catastrophe happens and when we have to start cannibalizing our nuclear weapons in order to keep some of our deterrent viable. But let me assure you, from everything I have heard, we have no time to waste. We have to get those reactors up and running as quickly as is technically and safely possible.

We also have to be prepared for the interim. Even if the Savannah River reactors come up, they are already 30-year-old reactors. The new production reactor capacity cannot be online for a decade. What do we do if those Savannah River reactors become nonoperational some time between now and a decade from now when the new reactors could be online?

For that reason, Secretary Herrington suggested that we actively pursue the development of tritium targets for use in light water reactors. The Department of Defense supports a continuing effort on the part of the Department of Energy to look at other alternatives. But in response to the question that Senator Symms asked, I think I can speak quite comfortably for the Chairman of the Joint Chiefs of Staff and for the acting Secretary of Defense, that we would find dependence on foreign supplies of tritium to be absolutely unacceptable for many of the same reasons that Admiral Watkins detailed.

This Nation cannot be in the position where it is dependent upon others to supply a material that is so critical to its nuclear deterrent as tritium is.

In the area of plutonium, there is a significant item in the DOE budget to provide us with the necessary capacity to produce plutonium for nuclear weapons. That is the Special Isotope Separation facility planned for Idaho. It is true that most of the identified needs of the Department—that is, the needs specifically spelled out in the nuclear weapons stockpile memorandum—are being met by the retirement of old weapons and the recycling of plutonium for new weapons.

However, we have to be prepared for the possibility that the Department of Energy's ability to recycle the plutonium from old weapons could be inhibited through a breakdown in one of these older facilities, through an environmental problem of some kind, or through a natural disaster. In order to be able to continue to meet our requirement to modernize the stockpile, what we need is a reserve of plutonium metal in case the complex goes down in some way. The SIS facility is the only one in the near term that will be capable of providing us with this insurance policy against potential future disaster.

In the area of highly enriched uranium, there is nothing in the 1990-91 budget that addresses this particular area, because, indeed, we do have sufficient supplies to meet our stockpile requirements in those 2 fiscal years. But it is highly likely—in fact, I would say sure—that in 1992 or 1993 we will be coming forward looking for funding for production of highly enriched uranium, because our stockpile requirements will call for it. We need a Department of Energy production complex that is capable of producing it.

Let me terminate my remarks there. The Department of Defense firmly supports the DOE 1990-91 budget request and firmly endorses this concept of addressing a modernization plan that will go over a 20-year or more period, and the Department of Defense is quite prepared to work with the Department of Energy and with the Congress of the United States in establishing a long-term plan that makes sense.

I, the Nuclear Weapons Council, and other members of the Department of Defense are prepared to testify at any time in a closed hearing where we can discuss classified information at length to help any Senator understand better why the Defense Department has the position that it has.

I thank you, Senator.

Senator ROBB. Thank you very much, Dr. Barker.

[The prepared statement of Dr. Barker follows:]

REVISED

STATEMENT BY

THE HONORABLE ROBERT B. BARKER

ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY)

BEFORE THE

UNITED STATES SENATE

COMMITTEE ON BUDGET

MARCH 15, 1989

INTRODUCTION

Mr. Chairman and members of the committee, thank you for inviting me here today to provide the Department of Defense (DoD) perspective on the "U. S. Department of Energy (DOE) Nuclear Weapons Complex Modernization Report." I am the Assistant to the Secretary of Defense for Atomic Energy and Staff Director of the joint DoD-DOE Nuclear Weapons Council.

Nuclear weapons are a national priority, and as their partners in this arena, DoD assisted the DOE in their study of Nuclear Weapons Complex Modernization by establishing the nuclear weapon production requirements that we believe the Department of Energy must be prepared to meet during the next 20 years, and beyond. Public health and safety concerns are also a national priority. We in DoD recognize that DOE facilities must meet modern environmental requirements if they are to reliably and safely continue to provide the nuclear weapons critical to the Nation's nuclear deterrent.

Funding for both modernization and environmental restoration of the DOE nuclear weapons complex are, properly, the responsibility of the Department of Energy. Since the creation of the Atomic Energy Commission, the Congress has supported the separation of responsibilities for nuclear weaponry that are borne by the two independent Departments: DoD and DOE share responsibilities for nuclear weapons safety. DoD funds weapon system acquisition. DOE funds the research, development, testing and production of nuclear warheads for these weapon systems.

DETERRENCE

For over 40 years, the focus of American strategic thought has been to sustain the credibility of our nuclear deterrent. Neither the prospect of a strategic defense system nor the prospects of arms reductions obviate the necessity to maintain a credible nuclear deterrent force. In today's world, there are four fundamental facets to maintaining a credible nuclear deterrent. First is the need for maintaining the effectivness, flexibility, and survivability of our nuclear stockpile in order to be responsive to a changing Soviet threat. Second is the need for a nuclear weapons complex that can meet U.S. defense requirements for nuclear weapons and materials in a reliable, safe, and environmentally sound manner. Third is the absolute requirement for an assured supply of critical nuclear materials. Fourth is the need to maintain the nuclear weapon technology base in this country such that our nuclear weapons research, development, test, and engineering capabilities are second to none.

Without question, these four factors are interdependent and inseparable. We cannot succeed in modernizing the stockpile without the capabilities provided by a technologically viable nuclear weapons production complex. The same complex must also be ready to rebuild weapons to incorporate modern safety and security features and dismantle retired weapons to recover valuable nuclear materials. In the near term, we cannot have an assured source of tritium unless we can safely restart the Savannah River reactors. For the long-term, we need new production capacity on an urgent and sustained schedule. We cannot expect to respond effectively to the evolving Soviet threat or to avoid technological surprise unless we maintain the state-of-the-art technological base of the nuclear weapon laboratories. These all require the Administration and Congress to make a long-term commitment such as that described in the "U.S. Department of Energy Nuclear Weapons Complex Modernization Report."

DoD CONTRIBUTIONS TO THE MODERNIZATION STUDY

The Presidentially-approved Nuclear Weapons Stockpile Plan establishes the minimum requirements for the mix and quantities of nuclear weapons and materials. The stockpile plan is prepared annually by the DoD-DOE Nuclear Weapons Council (NWC), of which I am the legislatively-directed Staff Director. The Nuclear Weapons Council is chaired by Dr. Cliff Duncan, the DoD's Director of Defense Research and Engineering; its other two members are Mr. Troy Wade, DOE's Acting Assistant Secretary of Defense Programs, and General Bob Herres, Vice-Chairman of the Joint Chiefs of Staff. Preparation of the stockpile plan begins as a joint undertaking of the Office of the Secretary of Defense, the Joint Chiefs of Staff with contributions from the Commanders-in-Chief, the Department of Energy, and the Military Services. The Nuclear Weapons Council reviews, approves, and then forwards the plan to the Secretaries of Defense and

Energy, who in turn review and refer the document to the President for final approval. Firm military requirements based on realistic threat assessments are integral to the stockpile plan. The process that develops this plan is sound and produces the minimum weapon mix to support the nuclear deterrent element of our national defense strategy.

In keeping with the Nuclear Weapons Council's (NWC) major role in establishing stockpile requirements, the NWC was directly tasked last year by the Secretaries of Defense and Energy, in response to prior tasking by the President and Congress, to assess nuclear weapon requirements for the next 20 years. This assessment was provided to the DOE Modernization Task Force to be used in developing a production complex modernization plan.

Based on this requirement, the DOE Modernization Task Force developed the "U.S. Department of Energy Nuclear Weapons Complex Modernization Report." The report addresses the research, development, and testing base needed to support continuing modernization of the nuclear deterrent as well as the size of the production complex necessary to support weapon production. An especially critical component of the production complex is the need to maintain an assured supply of nuclear materials; i.e., tritium, plutonium and highly enriched uranium. The complex must be capable of meeting annual requirements including contingency provisions to offset unanticipated outages of essential supply sources. In the near term we must work together to facilitate the safe and timely restart of the three reactors at Savannah River in accordance with DOE's phased restart plan.

The Report describes a real-world, resource-constrained blueprint for the future. We have reviewed the Report and are confident the proposed complex will satisfy weapons requirements. An initial analysis of costs was provided to the Congress when former President Reagan transmitted the Report. The estimate, which is not of budget-quality, is for $52B for modernization and $29B for environmental restoration over the next 20 years. These costs are additional costs over current operating requirements.

One must bear in mind that the fundamental design and construction of many of the DOE nuclear weapons facilities reflect environmental, safety, and health standards that predate current and more stringent requirements. In the last year, facilities such as Rocky Flats and Savannah River were shut down due to safety and environmental concerns. The frequency of such unplanned outages will only increase in the future unless modernization efforts are properly funded and implemented.

DoD supports the Administration's plan to maintain a state-of-the-art Department of Energy research, development, test and engineering capability, including underground nuclear testing, so that the Nation can respond to the Soviet threat and avoid technological surprise.

Reliability in meeting defense production requirements is firmly linked to meeting safety and environmental requirements. Damage to the environment or reduced safety must not be permitted in the process of producing the nuclear weapons vital to our national security. Failure to modernize aging nuclear weapons plants would place our nuclear weapon deterrent in serious jeopardy. Our ability to negotiate with the Soviets from a position of strength would also be jeopardized if we were not clearly in a position to modernize our nuclear forces in response to a changing Soviet threat.

NEW PRODUCTION CAPACITY NEEDED

One of the most important elements of modernization of the DOE complex is the acquisition of new material production capacity to replace the Savannah River reactors. These reactors, according to the National Academy of Sciences, all exhibit signs of acute aging which will limit their useful lives.

In accordance with Public Law 100-202, the Nuclear Weapons Council prepared recommendations to the Secretary of Energy for his use in preparing a new production capacity strategy. In formulating its recommendations, the Nuclear Weapons Council considered a set of limiting assumptions. Following the completion of a build program associated with stockpile modernization in the mid-to-late 1990's, a numerical and material steady-state condition was assumed in the post-1998 stockpile. New production capacity was assumed to be able to replace decay losses in the stockpile and to support the literal and virtual pipelines that connect the nuclear materials complex with the stockpile. On this basis, the Nuclear Weapons Council determined the minimum required tritium supply per year to support the nuclear weapons program in the post-1998 time frame. In addition to specific quantities of tritium, the Nuclear Weapons Council and DoD require that the supply be dependable and noninterruptible.

The Secretary of Energy has recommended a two-reactor strategy for new production capacity: a heavy water reactor at the Savannah River plant designed to produce the total tritium requirements when operating at full power, with concurrent preparation leading to the construction of a modular high-temperature gas-cooled reactor at the Idaho National Engineering Laboratory. The latter would produce 50 percent of minimum tritium requirements. As a contingency and consistent with the philosophy of the National Environmental Policy Act (NEPA) that all viable alternatives to major projects be fully considered, work would continue on target development for light water reactors. According to former Secretary Herrington, this recommended strategy was a "low-risk, cost-effective strategy (to) assure a tritium supply on an urgent schedule." We endorse this strategy.

FUNDING

The question of whether DoD is ready, willing, and able to provide funding for modernization of the DOE complex and public health and safety measures associated with weapons production has been asked more than once. This is not the correct question. The question is whether the Nation can afford not to maintain a reliable nuclear deterrent. Each Department has an assigned role and budget responsibility. DOE produces materials and weapons to meet the military and force structure requirements to maintain the viability of the nuclear deterrent and should be provided with the required budget authority. On the other hand, DoD acquires the military hardware to deliver the weapons if needed, and should be provided with the required budget authority. The lines of delineation are clear.

SUMMARY

I have attempted to provide the Committee with the sense that both modernization and environmental restoration are absolutely necessary if the Nation is to preserve its nuclear deterrent. DoD vigorously supports both modernization and meeting environmental requirements.

The foundation of our deterrent posture is, and will continue to be for the foreseeable future, our nuclear weapons capability.

o We must continue modernizing our strategic and nonstrategic nuclear forces, including our short-range nuclear weapon systems in support of the NATO defense posture.

o We must modernize the DOE production complex so that it is reliable, efficient, and capable of being operated in a safe and environmentally sound manner.

o We must maintain an assured supply of nuclear materials by restarting the Savannah River reactors and constructing, on an urgent time scale, a new production capacity.

o We must maintain a state-of-the-art Department of Energy research, development, test and engineering capability, including underground nuclear testing, so that the Nation can respond to the Soviet threat and avoid technological surprise.

Senator ROBB. Before we have any questions, we will ask Mr. Culp if he will give his presentation.

Mr. CULP. We have a chart that we would like to put up if we could.

Senator ROBB. You might bring it right up here so that, in this case, the folks that are here observing the hearing can see it. I do not expect any members to arrive over on this side during the remainder of this particular part of the hearing. You might bring it around so that the folks in the audience can see it, which is not always the case. I think our C-Span camera can pick it up adequately from here as well.

STATEMENT OF DAVID CULP, COORDINATING DIRECTOR, PLUTONIUM CHALLENGE

Mr. CULP. Thank you, Mr. Chairman.

My name is David Culp. I am speaking on behalf of the Plutonium Challenge, a working group of 14 national environmental and arms control groups. We also work with a number of groups around the DOE production sites in Colorado, Idaho, Ohio, South Carolina, and Washington State. These groups generally support this testimony but may differ on several points.

We appreciate the opportunity to address the Budget Committee concerning the severe problems facing the Department of Energy's weapons complex. After 40 years of weapons production, this country faces a massive radioactive and toxic contamination that will require decades to clean up, as well as an unsafe and broken down production complex. As a result of DOE's neglect and complacency, the health, safety and property of many citizens is endangered today. For these same reasons, our Nation has stopped producing both plutonium and tritium for the first time since the nuclear age began.

Rather than racing blindly to rebuild this production complex for the next 40 years of the arms race, however, we think that the Congress should carefully scrutinize the actual needs for these weapons materials, particularly in light of expected arms reductions agreements. During a time of tight budgets, Congress must also find the funds to develop and implement a long-term program that will resolve the environmental problems in the DOE weapons complex.

Over the past year, both DOE and GAO have released reports estimating the costs of environmental cleanup. DOE has estimated the bill for cleanup and compliance to be somewhere between $66 billion to $100 billion. GAO estimates has provided an estimate for cleanup and compliance that would be higher still, between $100 billion and $130 billion. Whatever the final number is, it is clear that the cleanup of the nuclear weapons complex is one of the most expensive environmental problems facing this Nation.

These costs are likely to rise for two major reasons. First, the nature and the extent of many of the cleanup problems, as well as their solutions, are unclear, making estimates tentative at best. For example, the estimate to clean up a commercial superfund site has more than doubled in the last 5 years, going from an average of $8 million in 1984 to $20 million today.

Second, the cleanup problems at many of these waste sites is worsening each day as contaminants continue to migrate into soil and water. This means that the costs will continue to rise at a rate above inflation.

Faced with the likelihood of increasing cleanup costs, we think the Congress needs to make a significant down payment on this problem in fiscal year 1990. Where will the money come from? Today, we are offering to the committee two budget alternatives that would eliminate unnecessary and redundant weapons projects. These proposed cuts in the President's budget are necessary first steps toward downsizing the nuclear weapons production complex. The idea of a smaller, leaner complex makes sense in light of the serious budgetary constraints, the reduced requirements for new plutonium, potential arms reduction agreements, and the critical cleanup needs.

The first budget alternative would eliminate construction funds for the SIS project, would cut the New Production Reactor (NPR) research and development funds to one reactor, and eliminate the NPR construction funds for fiscal year 1990. It would also eliminate several other marginal production projects and make across-the-board cuts in weapons research, development testing and production.

The second alternative, which is in the far right-hand column, includes most of the same cuts in nuclear materials production, including the SIS project, includes the same cuts in the New Production Reactor Program, leaves most of the funding for weapons activities at the President's proposed level, and includes a $295 million contribution from the Department of Defense budget.

Each budget alternative would make an additional $1 billion available for defense waste and environmental restoration, bringing the total for these activities to $2.3 billion.

Some have questioned whether these funds can be spent cost-effectively in fiscal year 1990. However, a DOE official recently testified before the Senate Armed Services Committee that "Clearly our needs exceed what is in the fiscal 1990 budget request."

Spending must increase substantially over the current proposal if cleanup is to be accomplished in a reasonable period of time. We believe it should be completed at least as swiftly as the modernization of the weapons complex. To achieve cleanup in 20 years—which is the time period DOE proposes to complete its modernization—annual spending would have to increase to $5 billion, assuming a total cleanup cost of approximately $100 billion.

Although DOE increasingly recognizes the magnitude of its cleanup problem, it still continues to emphasize production over cleanup. In the fiscal year 1990 budget request for DOE defense, out of $9.4 billion only $401 million, or 4 percent, is being earmarked for cleanup at DOE's 3,000 sites where hazardous or radioactive wastes have been dumped or leaked. This falls far short of what is needed. Without remedial action at many of DOE's waste sites, contaminants will continue to migrate into surrounding soil, water, and air, and cleanup costs will continue to increase. A number of the cleanup requests from DOE's field offices were cut in putting together the fiscal year 1990 budget request that is now before you.

In developing a legislative approach to balancing production and environmental needs, we think that Congress should recognize the following:

First, that cleanup and compliance costs are a major new element in the DOE budget;

Second, that cleanup costs will rise over time, especially if stabilization and remedial work is not begun immediately;

And, third, that the overall defense budget from which the funds for cleanup and compliance will come from is not likely to increase substantially.

Given these stark realities, we think there are three important steps Congress should take to strike a proper balance between production and environmental needs:

First, Congress should halt unnecessary and low-priority weapons production projects;

Second, Congress should substantially increase cleanup spending in fiscal year 1990 over the current request;

And, third, Congress should direct the Department of Energy to revise its long-term plans, as reflected in the 2010 report, to reflect the potential of future arms control agreements.

Thank you for the time.

Senator Robb. Thank you, Mr. Culp.

[The prepared statement of Mr. Culp follows:]

TESTIMONY OF

DAVID CULP
COORDINATING DIRECTOR OF THE PLUTONIUM CHALLENGE

BEFORE THE
SENATE BUDGET COMMITTEE

CONCERNING
THE DEPARTMENT OF ENERGY
FISCAL YEAR 1990 BUDGET

March 15, 1989

My name is David Culp. I am the coordinating director of the Plutonium Challenge, a working group of distinguished arms control analysts, nuclear scientists, military and intelligence experts and national scientific groups and citizens organizations representing well over a million Americans.

Accompanying me today is David Albright, Senior Staff Scientist with the Federation of American Scientists; James E. Beard, engineer and director of the Nuclear Weapons Project, Environmental Policy Institute; Nancy A. Donaldson, attorney and Washington director of Women's Action for Nuclear Disarmament; and Dan W. Reicher, Senior Project Attorney with the Natural Resources Defense Council.

National groups associated with the Plutonium Challenge include the Council for a Liveable World, Environmental Action, Environmental Policy Institute, Federation of American Scientists, Greenpeace USA, National Taxpayers Union, Natural Resources Defense Council, Nuclear Control Institute, Physicians for Social Responsibility, Public Citizen, Radioactive Waste Campaign, SANE/FREEZE, Union of Concerned Scientists, and Women's Action for Nuclear Disarmament. Regional groups associated with our working group are the Citizens Against Rocky Flats Contamination (Denver, Colorado), the Energy Research Foundation (Columbia, South Carolina), Hanford Education Action League (Spokane, Washington), Nuclear Safety Campaign (Seattle, Washington), Fernald Residents for Environmental Safety and Health (Fernald, Ohio) and the Snake River Alliance (Boise, Idaho).

I. Introduction and Summary

We appreciate the opportunity to address this committee concerning the severe problems facing the U.S. Department of Energy (DOE) nuclear weapons production complex. After forty years of weapons production, the United States faces massive radioactive and toxic contamination that will require decades to clean up, as well as an unsafe, broken down production complex. As a result of DOE's neglect and complacency, the health, safety and property of many citizens is endangered. For these same reasons our nation has stopped producing both plutonium and tritium for the first time since the nuclear era began.

Rather than racing blindly to rebuild the production complex for the next forty years of the arms race, however, the Congress should carefully scrutinize the actual needs for these weapons materials, particularly in light of expected arms reductions agreements, such as the START treaty. During a time of tight budgets, Congress must also find funds to develop and implement a long-term program that will resolve the environmental problems in the DOE weapons complex.

In this testimony, we present two alternative FY 1990 budget proposals for nuclear weapons related activities. Both scenarios eliminate unnecessary and redundant projects in DOE's nuclear weapons production complex. Scenario I results in $1 billion in cleanup funding through cuts in DOE's weapons budget only. Scenario II achieves the same cleanup funding level by making smaller cuts in DOE's weapons budget and transferring funds from Department of Defense activities. Since DOE's staggering environmental problems are largely the unpaid costs of supplying the Department of Defense with nuclear weapons, it is reasonable that DOD shoulder part of the cleanup bill.

II. The Nuclear Weapons Complex: An Important Budget Concern

A. The DOE Nuclear Weapons Complex

DOE's 17 major nuclear weapons research and production facilities are located in 13 states, employ about 90,000 people, and occupy an area twice the size of Delaware. They are operated by corporations such as General Electric, Monsanto, Westinghouse, and Rockwell International, as well as major universities such as the University of California and the University of Chicago.

At the production facilities, materials such as plutonium and tritium are produced in nuclear reactors, concentrated in processing plants, fabricated into components, and, together with dozens of electronic and explosive parts, assembled into warheads. Since the early 1940s, the plants have produced some 60,000 nuclear warheads, over one third of which are still in the arsenal.

B. DOE Waste Management

The warhead production process, described by the General Accounting Office as "potentially one of the more hazardous industrial operations in the world," has generated massive volumes of toxic and radioactive waste, much of which has been gravely mismanaged.[1] Overall, GAO reports that groundwater beneath many DOE facilities, including the Hanford Reservation (Washington), the Savannah River Plant (South Carolina), the Y-12 Plant at Oak Ridge (Tennessee), the Feed Materials Production Center (Ohio), the Rocky Flats Plant (Colorado), and the Lawrence Livermore Laboratory (California) is contaminated with hazardous and/or radioactive substances at levels hundreds or, in some instances, thousands of times above drinking water standards. At Hanford and Savannah River, for example, GAO found radioactive materials in groundwater at more than 400 times the EPA drinking water standard.[2]

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[1] General Accounting Office, "Environmental Issues at DOE's Nuclear Facilities," GAO/RCED-86-192, September, 1986.

C. The Costs of Cleanup

Over the past year, DOE and GAO have released reports estimating the costs of environmental cleanup and compliance activities at DOE's nuclear weapons production complex. A DOE report released in July 1988 estimates that the bill for cleanup and compliance could be $66 to $110 billion. GAO estimates that DOE cleanup and compliance costs could be higher still: $100 to $130 billion, or $1.6 to $2.1 million for every nuclear warhead the United States has produced. Subsequent DOE reports contain similar estimates, making it clear that environmental cleanup and compliance at DOE's nuclear weapons production complex is one of the most expensive environmental problems facing the nation.

Table 1.--DEPARTMENT OF ENERGY CLEANUP AND COMPLIANCE COSTS

Cleanup or Compliance Activity	Estimated Cost (billions of dollars)	
	DOE	GAO
Corrective Action	6-14	20
Remedial Action	35-63	35-65
Radioactive Waste Management	4-5	30
Decontamination/ Decommissioning	3-4	15
TOTAL	48-86	100-130
Base Program (annual cost)	1.4	__*

* GAO does not include base program funds in its estimate because it considers them a "normal cost of doing business that be necessary whether DOE had any problems or not."

SOURCE: GAO/RCED-88-197BR, July 1988, and DOE/EH-0079, December 1988

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[2] GAO/RCED-86-192, at 16.

And these cleanup costs are likely to rise. First, the nature and extent of many cleanup problems as well as their solutions are unclear, making estimates tentative at best. Second, the cleanup problems at many waste sites worsen each day as contaminants continue to migrate into soil and water. This means costs will escalate at a rate well above inflation.

Third, according to GAO, some sites may require "long-term institutional care" because of the difficulty of cleanup. Costs could accrue essentially forever at these so-called "national sacrifice zones."

Fourth, Congress, EPA, and the states will likely strengthen safety and health programs. For example, EPA may soon impose stricter closure standards under the Resource Conservation and Recovery Act for old waste sites. Also, soil contamination standards, similar to those now in effect in California, may be adopted by other states.

Fifth, ongoing health studies of DOE workers and individuals living around weapons plants may reveal health problems attributable to DOE or contractor operations. If the liability for such problems flows to the federal government, huge costs could result.

Finally, experience with commercial waste sites as well as DOE construction projects suggests that the current cleanup costs may have been underestimated. EPA's estimate of the cost to clean up a commercial Superfund site has more than doubled in the last five years, from an average of $8.4 million in 1984 to $20 million today.

II. Cutting Unnecessary and Low Priority DOE Weapons Programs

The following section proposes reductions in unnecessary or low priority nuclear weapons projects FY 1990. These proposed cuts are a necessary first step towards downsizing DOE's nuclear weapons production complex in light of serious budgetary constraints, reduced requirements for plutonium production, anticipated strategic nuclear arms reduction agreements, such as the START treaty, and critical cleanup needs.

A. Alternative Budget Proposals

Both of the alternative budget scenarios presented here propose cuts in the three major DOE nuclear weapons production budgets -- nuclear materials production, the new production reactor program, and nuclear weapons activities.

Both budget scenarios make an additional $1 billion available for cleanup. Both scenarios also add $30 million to verification activities that will be increasingly necessary as the United States and the Soviet Union negotiate arms control agreements. Neither of these budget scenarios calls for any increase in the total Department of Energy budget above the level requested by President Bush.

Budget Scenario I, emphasizing across the board cuts in DOE's weapons production budgets in FY 1990, would:

* eliminate Special Isotope Separation plant construction funds;
* eliminate plutonium separation and processing at Hanford and the Savannah River Plant;
* postpone the restart of the Savannah River reactors at least until the second half of FY 1990;
* eliminate Fernald modernization funding,
* eliminate operation of and new construction funds for the Idaho Fuels Processing Facility;
* cut New Production Reactor R&D funding from $203 million to $120 million, and eliminate NPR construction funds;
* make across-the-board cuts in nuclear weapons research, development, testing and production, including Nuclear Directed Energy Weapons.

Budget Scenario II emphasizes cuts in FY 1990 budgets for unnecessary or low priority activities programs that have contributed most to the current cleanup problem, and for the first time bills the Department of Defense for some of the costs of cleanup at DOE's nuclear weapons production facilities. Scenario II would:

* include the same cuts in nuclear materials production, except for allowing continued operation of the Idaho Fuels Processing Facility;
* include the same cuts in the New Production Reactor program;
* restore funding for nuclear weapons research, development and testing, including Nuclear Directed Energy Weapons, but retain the budget cuts in the nuclear weapons production program;
* include a $295 million contribution from Department of Defense program cuts, to bring cleanup and environmental restoration funding up to $1 billion in FY 1990.

Table 2.--ALTERNATIVE FUNDING LEVELS FOR MAJOR DOE WEAPONS PROGRAMS
FY 1990 (MILLIONS OF DOLLARS)

	PRES. BUSH'S	RECOMMENDED FUNDING	
	BUDGET REQUEST	SCENARIO I	SCENARIO II
A. NUCLEAR MATERIALS PRODUCTION			
1. Special Isotope Separation Plant			
a. R&D at Livermore	79	79	79
b. Construction in Idaho	115	0	0
2. Plutonium separation and processing at Hanford	164	0	0
3. Plutonium separation at SRP			
a. Separation	?[*]	0	0
b. Construction	10	0	0
4. Savannah River reactor operation	199	150[**]	150[**]
5. Modernization at Fernald	19	0	0
6. Idaho Fuels Processing Facility			
a. Processing operations	78	0	78
b. Construction	55	0	0
7. Remaining projects	1,495	1,495	1,495
SUBTOTAL	2,214	1,724	1,802
B. NEW PRODUCTION REACTORS			
1. R&D	203	120	120
2. Construction	100	0	0
SUBTOTAL	303	120	120
C. WEAPONS ACTIVITIES			
1. Weapons R&D and testing			
a. Nuclear directed energy weapons			
1) Program activity	145	75	145
2) Testing	121	60	121
b. Weapons R&D (minus NDEW)	1,239	1,177	1,239
c. Weapons testing (minus NDEW)	479	455	479
2. Weapons production	2,554	2,416	2,416
3. Program direction	100	100	100
SUBTOTAL	4,638	4,283	4,500
D. DEFENSE WASTE AND ENV. REST.			
1. Defense waste	900	1,300	1,300
2. Environmental restoration	401	1,000	1,000
SUBTOTAL	1,301	2,300	2,300
E. VERIFICATION AND CONTROL TECH.	149	179	179
F. OTHER ATOMIC DEF. ACTIVITIES	781	781	781
TOTAL DOE ATOMIC DEFENSE	9,387	9,387	9,682
G. CONTRIBUTION FROM DOD	0	0	(295)
TOTAL	9,387	9,387	9,387

NOTES TO THE TABLE

* The funding for plutonium separation at the Savannah River Plant is not listed separately from processing operations at this site in the FY 1990 budget request.

** We recommend not restarting the Savannah River reactors until at least half way through FY 1990. We estimate that this would save over $50 millio in operating costs in FY 1990.

III. Justifications For Cuts in the Nuclear Weapons Production Budget

The following sub-sections provide brief justifications for the production budget cuts proposed in the two scenarios above.

A. Nuclear Materials Production

Special Isotope Separation Plant,
Idaho National Engineering Laboratory, Idaho

The Special Isotope Separation (SIS) Plant is intended to purify plutonium for use in nuclear weapons. Lasers would be used to convert "fuel-grade" plutonium to "weapon-grade" plutonium. We recommend that construction funding be eliminated, because weapon-grade plutonium is not in short supply. Since plutonium essentially lasts forever, it can be fully recycled from retired weapons. Former Secretary of Energy Herrington told Congress last year that the nation is "awash in plutonium." This plutonium glut would be further swelled by a Strategic Arms Reduction Treaty. In a House of Representatives hearing in February, the GAO urged Congress to reevaluate the SIS project.

Plutonium Separation and Processing (PUREX and Z Plant)
Hanford Reservation, Washington

The PUREX (Plutonium Uranium Extraction) Plant recovers plutonium and uranium by chemically processing spent fuel from the N-Reactor. The Plutonium Finishing Plant (usually referred to as the Z Plant) converts plutonium oxide from PUREX into plutonium nitrate or plutonium metal. The majority of remaining N-Reactor spent fuel contains 'fuel-grade' plutonium, which would need to be further processed to be converted into weapon-grade plutonium.

PUREX and Z Plant operations are unnecessary for the same reason the Special Isotope Separation Plant (SIS) is not needed: DOE has a more than sufficient inventory of plutonium available for use in nuclear weapons.

Scrap plutonium recovery operations carried out at Hanford could be continued with a relatively small amount of funds, or they could be consolidated with scrap recovery operations at other sites.

Plutonium Separations at the F Canyon,
Savannah River Plant, South Carolina

The F Canyon plutonium separations facility recovers super-grade or weapon-grade plutonium from uranium targets irradiated in the Savannah River Plant (SRP) reactors. The Savannah River reactors are currently shut down for safety modifications. When and if they are restarted, they are expected to be dedicated to tritium production for several years. For this reason, the SRP plutonium separations budget for FY 1990 can be eliminated, and F Canyon construction activities deferred.

Savannah River Reactor Operations,
Savannah River Plant, South Carolina

We recommend a cut in FY 1990 Savannah River Plant reactor operations budget based on the assumption that the SRP reactors will not be restarted during the first half of FY 1990. This assumption appears to be reasonable given that the most optimistic DOE projections use target dates in the second quarter of FY 1990. These cuts are not intended to affect Environmental, Safety & Health programs.

Modernization of the Feed Materials Production Center,
Fernald, Ohio

The Fernald facility processes depleted and slightly enriched uranium materials, preparing them for weapon components fabrication and for irradiation in the N-Reactor and the Savannah River reactors for plutonium production.

However, the N-Reactor is not expected to restart and the Savannah River reactors will be dedicated to tritium production at least for the several years after they are restarted. In addition, DOE is planning to end production operations at Fernald by the mid-1990's. We therefore recommend that modernization funds at Fernald related to reactor operations be eliminated.

Idaho Fuels Processing Facility
Idaho National Engineering Laboratory, Idaho

The Idaho Fuels Processing Facility, including the Idaho Chemical Processing Plant, reprocesses highly enriched uranium fuel from naval reactors, government-owned research reactors, and domestic and foreign civilian research reactors. According to DOE testimony, the recovered highly enriched uranium (HEU) is sent to the Savannah River Plant to be made into fuel for the Savannah River reactors. The recovered HEU is not used as fuel for naval reactors.

There is a greatly reduced need for this recovered highly enriched uranium since the SRP reactors are not operating, and once restarted will operate at reduced power levels. In Budget Scenario I we recommend that the budget for processing operations at the Idaho Fuels Processing Facility be cut, and that construction and renovation activities be halted. The spent fuel would be stored until a permanent disposal site is completed. Should continued reprocessing of HEU prove necessary, these operations could be consolidated at the Savannah River Plant which also operates a facility that reprocesses HEU fuel.

Under Scenario II, processing at the Idaho plant would continue but construction activities would be deferred pending a re-evaluation of the need to rebuild this HEU reprocessing plant as well as the facility at the Savannah River Plant.

B. New Production Reactor Program

DOE has proposed the construction of two New Production Reactors and associated facilities to provide an assured long-term source of tritium for nuclear weapons and to provide a back-up capacity for plutonium production. DOE is planning to build a 2,500 megawatt heavy water reactor at the Savannah River Plant and also to build a Modular High Temperature Gas-Cooled Reactor (MHTGR) at the Idaho National Engineering Laboratory. DOE has stated that together these reactors could provide 150 percent of the projected annual tritium requirement. DOE is also developing the target technology necessary for production of tritium in light water nuclear reactors.

Given tight fiscal constraints, no need for excess tritium production capability, and the shortage of technical expertise within DOE and among the Department's contractors, we recommend that a second reactor not be built. This would permit a reduction in the FY 1990 NPR support and R&D budget to about $120 million. Pending the outcome of the R&D effort, we also recommend that no funds be allocated to construction of the first NPR in the FY 1990 budget.

C. Weapons Activities

Nuclear Directed Energy Weapons

This program, part of the Strategic Defense Initiative, is justified as an assessment of potential Soviet threats. In reality, the program is developing nuclear directed energy weapons technology, such as an X-ray laser pumped by a nuclear explosion, for a variety of potential U.S. offensive and defensive military missions.

This program should at the very least be cut in half, since it will have at best a marginal impact on U.S. national security, yet will be tremendously expensive to complete. Actual production of nuclear directed energy weapons would require further huge expenditures. A much cheaper and safer means of countering any potential Soviet threat in this area would be to negotiate a low-threshold or a comprehensive test ban treaty and to strengthen the ABM Treaty.

Weapons Research & Development (excluding Nuclear Directed Energy Weapons)

The primary purpose of the weapons research and development programs is the development of new nuclear weapons. Its activities are primarily conducted at Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratory. In Scenario I we recommend a cut of 5 percent in the weapons R&D budget, over and above what has been cut from the Nuclear Directed Energy Weapons program. These cuts are not intended to affect Environmental Safety and Health activities. Scenario II makes no cuts in this program.

Weapons Testing (excluding Nuclear Directed Energy Weapons)

Underground nuclear weapons testing is a part of the overall weapons research and development program. The core program of the underground testing effort supports weapons research and development, improvements in stockpiled weapons, and weapons effects research.

The recommended cut of 5 percent in Scenario I reflects belt-tightening DOE must undertake throughout its programs. The cut also reflects a reduced need for nuclear testing now that the United States and the Soviet Union have embarked on reducing their nuclear arsenals. These cuts are not intended to affect Environment, Safety, and Health programs.

Weapons Production

This program mainly involves the procurement of non-nuclear materials for warheads, the fabrication and assembly of nuclear weapons, and the maintenance of existing nuclear weapons. The Rocky Flats and Y-12 at Oak Ridge facilities are part of this program.

The recommended cut of $138 million again reflects belt-tightening throughout DOE's programs. It reduces the Bush Administration budget request to the Reagan Administration FY 1990 request level. The Reagan request represented an increase of $169 million over the FY 1989 appropriation. The cuts in weapons production activities are not intended to affect Environment, Safety, and Health or safeguards and security programs.

IV. Increasing Funding For Environmental Restoration and Defense Waste

The alternative budget scenarios developed above provide an additional $1 billion in FY 1990 for defense waste and environmental restoration bringing the total for these activities to $2.3 billion. The issue is whether these funds can be spent cost effectively in FY 1990. When we embarked on this analysis we expected to develop project-specific cleanup recommendations for each DOE weapons plant. We found this to be an extremely difficult task.

First, it appears that in many cases individual facility funding requests for the annual budgets are kept arbitrarily low to minimize increases in the total clean up budget. As Raymond Berube, DOE Deputy Assistant Secretary for Environment admitted at a recent Senate Armed Services Committee hearing, "Clearly our needs exceed what's in the Fiscal 1990 budget request." With such unrealistically low annual funding levels, the Congressional budget process is reduced largely to an unfortunate contest between Congressional delegations over which site should receive additional funding.

Second, recommendations for increasing funds for many specific corrective actions cannot be made because existing corrective action projects cannot be identified in DOE's budget. "Corrective Action" includes upgrades of existing facilities to bring them into compliance with environmental safety and health standards. Overall, DOE estimates that corrective action across the complex will cost $6 to $14 billion. GAO estimates that $20 billion could be required. But in annual budgets DOE does not break out specific spending on corrective action. Instead, the millions of dollars of corrective action funds are spread out among a variety of budget categories including "Weapons Activities" and "Nuclear Materials Production." As a result, specific funding recommendations are difficult to make.

Third, in some cases the information necessary to develop individual recommendations is simply unavailable. For example, in order to recommend a funding increase for a particular cleanup project, detailed technical information is required, including a site-specific estimate of a proposed remedial action and detailed data on the work that has been accomplished to date. This information is not included in DOE's public documents which generally describe individual projects in broad language, if they are described at all. The only possible source of this information is DOE and contractor personnel who have detailed information on the status of thousands of cleanup projects across the weapons complex and the costs for implementing various phases of cleanup work at each of those projects. Our initial efforts to obtain this information from DOE were not successful, but are continuing.

Despite these difficulties in making site-specific recommendations, it is clear that spending must increase substantially over the current proposal if cleanup is to be accomplished in a reasonable period of time. Our view is that cleanup should be completed at least as swiftly as the modernization of the weapons complex. Therefore spending must be ramped up substantially over the next few years. To achieve cleanup in 20 years -- the time period DOE proposes for complete modernization of the weapons complex -- spending must increase to a rate of about $5 billion over the next few years assuming total cleanup costs of $100 billion. If cleanup is to be finished in 30 years then the annual funding must be increased to $3.3 billion.

Although DOE increasingly recognizes the magnitude of its cleanup problem, the Department unfortunately continues to emphasize production over cleanup. The Department's FY 1990 budget request for nuclear weapons production is about $9.4 billion. Just $372 million, or some 4 percent, is earmarked for remedial action at DOE's 3,000 sites where hazardous or radioactive wastes have been dumped or leaked. While this is a $230 million increase over FY 1989, it falls far short of what is needed.

DOE's response to decontamination and decommissioning needs in the FY 1990 budget is equally inadequate. Just $29 million is allocated to these activities in DOE's proposed budget while the Department estimates that $3-$4 billion in total will be required.

Over the long run, DOE's cleanup plans are equally dismal. Under the spending scheme outlined in the so-called "2010 Report,"[3] the weapons complex would be fully modernized at a cost of $52 billion above current funding levels by the year 2010. In contrast, the "2010 Report" over the same period of time provides only a $29 billion increase -- less than half of what is required -- above the minuscule current funding levels for remedial action and decontamination and decommissioning. Thus the "2010 Report" makes clear that these cleanup activities will continue to take a backseat to weapons production.

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[3] Department of Energy, "United States Department of Energy Nuclear Weapons Complex Modernization Report: Report to Congress by the President," December 1988.

DOE's half-hearted commitment to cleanup was explained at a recent Senate Armed Services hearing where DOE officials testified that they selected the funding levels for remedial action and decontamination and decommissioning based not on a detailed assessment of site-by-site requirements through the year 2010, but instead on how much money they thought might be available. With this extraordinary admission, DOE revealed that the "2010 Report" is really little more than a wish list of weapons production projects, with budget leftovers going to cleanup.

V. Areas Where Cleanup Funds Should Be Increased

While we cannot provide a comprehensive set of recommendations about how to increase the FY 1990 cleanup budget, many cleanup needs will go unmet -- and cleanup costs in many cases will therefore rise -- if funding is not increased. In this section we describe some general areas where DOE, if pressed, could identify and carry out a far more extensive cleanup program in FY 1990.

A. Remedial Action

Without swift remedial action at many of DOE's 3000 waste sites, contaminants will continue to migrate into surrounding soil, water or air and cleanup costs will therefore increase. While the Department's FY 1990 budget request for remedial action of $372 million is a $230 million increase over FY 1989, it falls far short of what is needed. There are a number of initiatives which should be undertaken or accelerated in FY 1990 in order to slow the spread of contamination and lay the groundwork for the massive increase in cleanup activities that will be required in the future.

First, increased use of interim remedies should be considered at some sites. For example, at sites where groundwater is being contaminated, actions can be taken, such as counterpumping or excavation of contamination hotspots, which can reduce the flow of pollutants. Interim remedies have been recommended by the Office of Technology Assessment[4] and by private contractors having significant experience with the Superfund process.[5] With 3000 waste sites in the weapons complex there are clearly situations, beyond those DOE has so far identified, where interim remedies would be a cost-effective approach.

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[4] Office of Technology Assessment (U.S. Congress), Superfund Strategies, April 1985, p. 39.

[5] See, e.g., testimony of William A. Wallace, CH2M Hill, and Gary A. Dunbar, CDM, before the House Subcommittee on Commerce, Transportation and Tourism, 1983, No. 98-128.

Second, there inadequate laboratory facilities for the large number of waste samples required for site characterization and cleanup. Site characterization and cleanup cannot progress without sufficient analytical capacity. For example, DOE does not expect to complete characterization of the wastes in single-shell high-level radioactive waste tanks at Hanford until 1998, in part because of a lack of laboratory capacity. This is an unacceptable delay which could be reduced if spending on laboratory facilities was increased in FY 1990.

Third, the necessary technology for solving a number of cleanup problems is not in existence. One critical example is the technology necessary for removal of high-level radioactive wastes from the Hanford tanks. Under the current schedule, development of waste retrieval technology will not be completed until at least 1994. Moreover, closure of all the tanks will not occur until 2018. Clearly, if three of the reactors and three of the reprocessing plants which produced the Hanford tank wastes in the first place could be built in less than two years as part of the Manhattan Project we ought to be able to clean up the wastes in less than 39 years!

Fourth, groundwater monitoring is critical to effective cleanups, but at some sites the slow pace of well installation has prevented DOE from identifying contaminants before they spread to critical on-site and off-site water supplies. For example, at the Paducah Gaseous Diffusion Plant in Kentucky, which was part of the complex used to produce weapon-grade uranium, cancer-causing solvents were found recently in off-site drinking water wells. Had monitoring wells been in place earlier the spread of pollutants off-site could have been detected, thereby preventing the contamination of the water supplies.

B. Decontamination and Decommissioning

These activities involve cleanup and in some cases dismantling of contaminated buildings that are no longer in use. DOE has identified 220 such buildings. For example, uranium-contaminated equipment and massive quantities of asbestos must be removed from the half-mile long K-25 facility at Oak Ridge, Tennessee, which has not operated since 1964. Many nuclear reactors in the weapons complex must be decontaminated and decommissioned, including eight idle reactors at Hanford alone. Overall, DOE estimates that $3 to $4 billion will be needed for decontamination and decommissioning. This is likely to be a substantial underestimate given the lack of experience with decontamination and decommissioning, and the accelerating costs of radioactive waste disposal. GAO's estimate for decontamination and decommissioning, which includes funds for facilities currently in use, is over $15 billion.

As with remedial action, DOE's response to decontamination and decommissioning needs in the FY 1990 budget is inadequate. Just $29 million is allocated to these activities in DOE's proposed budget. At this spending level, decontamination and decommissioning projects will take 103 to 137 years assuming DOE's current estimate and 517 years assuming GAO's estimate.

C. Radioactive Waste Management

This program includes activities related to the disposal of radioactive wastes. DOE has been temporarily storing high-level wastes at Hanford, Savannah River and the Idaho National Engineering Laboratory. Some of this waste, especially at Hanford, has leaked into the ground. The DOE is currently in the final stages of completing a $1 billion high-level waste vitrification plant at the Savannah River Plant which will embed radioactive wastes in high-integrity glass. DOE then plans to dispose permanently of the vitrified waste in a high-level waste repository, currently proposed for Yucca Mountain, Nevada.

Because of the important role vitrification can play in solving the high-level waste problems at Hanford and the Idaho National Engineering Laboratory, DOE should be moving ahead on an urgent basis with the design and construction of vitrification plants at both of these facilities. Unfortunately, under current spending plans a vitrification plant will not be operating at Hanford until the turn of the century and at the Idaho facility one will not even be under construction until after that date. Clearly, accelerated funding now could bring these critical facilities on-line faster.

Congress' Response

We have demonstrated that substantial savings can be realized by cutting unnecessary and low-priority DOE nuclear weapons programs. We have also suggested cleanup activities on which these additional funds could be spent, including some that would contain existing contamination and thereby reduce overall spending.

In developing a comprehensive legislative approach to balancing production and environmental needs in the weapons complex, Congress must address the following facts. First, DOE cleanup and compliance costs will, over the next several decades, constitute a major new element in DOE's budget. Second, cleanup costs will rise over time, especially if stabilization and remedial work is not begun immediately. Third, the overall defense budget (the "050" account), from which funds for cleanup and compliance will come, is not likely to increase substantially, and in fact may remain static in real terms.

Given these stark realities, there are three important steps Congress must take in order to strike a proper balance between production and environmental needs:

- Congress must halt unnecessary or low-priority weapons production projects;
- Congress must substantially increase cleanup spending in FY 1990 over the current request;
- Congress should direct DOE to revise its 2010 study to reflect potential arms control agreements, such as the START treaty, a low threshold or comprehensive test ban treaty, and a fissile material cutoff agreement, and to provide for cleanup in the same time frame as modernization;

We stand ready to assist Congress in any way we can to ensure that these critical steps are taken.

Senator Robb. Let me ask Mr. Peach and Dr. Barker, if I could, to comment on Mr. Culp's proposals at this point, his way of perhaps engaging and joining the issue in ways that might be useful for the committee in making some of its determinations.

Mr. Peach, would you like to begin?

Mr. Peach. I can refer to some of the information that was included in my more detailed statement. I think as you take apart the budget, at least as the Department of Energy has represented the figures, they had of the $9.4 billion requested about $3.7 billion to address the problem areas that were spelled out in the modernization study. These include increases in modernization activities from $471 million up to $1.3 billion. So there was a substantial increase in modernization as they moved forward with a greater construction program.

They said in their report—and I think there probably needs to be some recognition—that the level of investment in their facilities, was about 2 percent a year over the history of the projects, as contrasted with the level of investment of 4 to 7 percent which you would often see in the private sector or other places to keep them where they ought to be. So, to some extent, we can say we had not been making the investment that we should have been making in some of those facilities for modernization. That is why we had the safety problems at some of the reactors.

In the area of environmental compliance, safety and health, they increased the budget by $383 million up to $1.4 billion. So there was a fairly substantial increase in what they were putting into environmental compliance activities to bring their facilities up to compliance with the regulations and standards that they should have been complying with.

Then, lastly, environmental cleanup was increased to about $400 million. Now, that is an area that is of contention, and people have said, can you spend more money in that area and let us get on with it? The caveat we have raised is while it does not sound like a lot, and while in principle you can agree with the idea of wanting to spend more there and trying to get on with it, the stage we are in terms of understanding the problem could also cause us to spend inefficiently. They are now working to try to understand the total scope of the problem, and I think Admiral Watkins said he is trying to figure out how he gets his arms around it to know where he wants to set the priorities. He has promised that he would give you in the months ahead a 5-year plan, and that he would not just look at a linear ramp-up of expenditures, but would try to look practically at where priorities ought to be set, what is important, and what needs to be done.

I think that is very important to do that. But on the other hand, I am hesitant to push him too far but I would like to give him time to try to do that. As I mentioned, we have been in this area since 1981 or 1982, and to some degree I feel like we have been trying to get people's attention on some of these kinds of problems over those years. And I think in the case of the new Secretary, he is a person that you do not have to get his attention on these problems. He is indicating he wants to pay attention to them. So I would like to see him given the opportunity to produce that kind of plan.

What we are calling on him to do is to produce a plan that could give us more specifics and a better basis for understanding and then debating what the priorities are.

Senator **Robb**. Thank you, Mr. Peach.

Dr. Barker, would you like to comment from the DOD perspective?

Dr. **Barker**. Yes, I would. I find myself in agreement with a great many of the comments just made by Mr. Peach. The Department of Defense is certainly not in a position to second-guess the Department of Energy on the details of its environmental restoration program, but I do believe that the Congress should take full cognizance of the fact that certainly throwing money at a problem without the ability to manage it, and without a coherent plan on which to spend it effectively, probably ends up wasting money.

So I would join Mr. Peach in encouraging this committee to give Secretary Watkins the opportunity to come forward with a plan and potentially reinforce the statement he made earlier today, that he believed that the 1990 and 1991 budget was right in terms of the amount of money that the Department of Energy could effectively spend in those areas.

There is one other area of Mr. Culp's testimony on which I must comment. I do not want anybody to leave here with the idea that there are unnecessary and low-priority weapons activities going on in the Department of Energy budget, at least not based on any information that has been provided to me by the Department of Energy.

We had some very hard, tough discussions over the last year in the Nuclear Weapons Council about what kinds of funds DOE was going to need in order to meet Defense Department requirements, what the DOE budget request was going to be. I am under the impression that this is about as lean a budget as can be sustained and still meet the requirements identified by the President of the United States, based upon input from the Chairman of the Joint Chiefs of Staff and the Secretary of Defense.

There is one statement perpetuated in Mr. Culp's formal statement that I wish we could somehow or other erase. Secretary Herrington has done everything he possibly could to correct the record, and yet one finds this on page 8 of Mr. Culp's testimony. He talks about Secretary Herrington telling the Congress last year that the Nation is "awash in plutonium."

I personally was present when Secretary Herrington told the Senate Armed Services Committee that that statement of his was in error; that the United States was not then awash in plutonium; and I can assure you it is not awash in plutonium right now.

We need the New Production Reactors for an assured supply of tritium in the future. We need SIS in order to provide a reliable reserve for the foreseeable future. Many of the plutonium-related proposals in Mr. Culp's testimony seem to be based on this testimony of Secretary Herrington that we were awash in plutonium. I want to tell you, Senator Robb and Senator Symms, we are not. If you check with Secretary Herrington today, he will tell you he made that statement in error originally, and we are not awash in plutonium. We need every one of those facilities to meet national security requirements.

Thank you.

Senator ROBB. Thank you, Mr. Barker, for correcting the record on that particular point. We hope that your correction will be appropriately observed or contested, but at least recognized as a correction to that record.

Senator SYMMS. Thank you very much, Mr. Chairman. As I had to meet with constituents, I will look through your testimony, Mr. Culp.

I had five questions, Dr. Barker, all dealing with things that you have spoken to. You have answered with support for the Defense Department's Nuclear Weapons Council, the need for two reactors, two technologies, and two sites, in order to have a dependable and noninterruptable supply of tritium.

Dr. BARKER. Emphatically.

Senator SYMMS. You have answered the special isotope facility question in terms of being a priority.

One point that I do not know whether you addressed concerns the SIS. You stated that we have to make these decisions based on what the current threat is.

In my view, the SIS will actually clean up weapons—that is, it will clean up plutonium, and in terms of value over the life of the SIS project, it will clean up unusable material, making it usable as well as a cost-saving device. There is a value there; is that not correct?

Mr. PEACH. I am going to have a slight——

Senator SYMMS. Setting aside national defense, national security, and START treaties.

Mr. PEACH. I am not sure that I am in agreement with that, although I would like to hold open the possibility to look a little bit more carefully behind that, and include if necessary the information in the record to elaborate on what I am going to say. Because, to some degree, at least, my understanding of that at this point is you would both have to reprocess that fuel grade plutonium to a degree before it goes through the SIS process. So although the SIS process itself has some benefits, you are also going to have the reprocessing type steps that are going to take place. And you have some possible waste that is created by that.

Senator SYMMS. In terms of cost, the improved value of the plutonium in itself is worth more than what the cost is of building the SIS.

Mr. PEACH. I have not seen any figures on that.

Senator SYMMS. I think that is the case.

Mr. PEACH. The Department of Energy has not done its own analysis of this issue, Senator Symms. Certainly, your statement is consistent with what I have heard from the Department of Energy, but not wanting to add to Admiral Watkins' burden, make it any larger than what it already is, you might put that on the record for the Department of Energy.

I have been in several hearings with the Department of Energy, where there has been a considerable amount of discussion about the SIS, and that has not been one of their points that their witnesses have made so far.

Senator SYMMS. I want to also ask you a question, regarding the dual reactors, because I think these reactors fit into the national security effort. Mr. Peach, in considering the cost of the new production facilities, did GAO consider the long-term savings that would come from the sale of power or steam from the MHTGR, savings that could more than make up for the initial cost of the reactor? Was this considered in your cost estimates?

Mr. PEACH. We have not done any specific cost estimates that have been made public on that. We have only commented based on our review so far of the Department of Energy's plan. We have under way a detailed review of the basis for the new production reactor decisions made by the Department, which we hope to complete in the next few months, which is looking behind all the information available.

Senator SYMMS. Good. I am glad you are going to look into that, because the agreement in Idaho, as they continue building one module at a time, is that the steam will be sold to the Idaho Power Co. The Idaho Power Co. has said they will buy it and feed it into the grid. In the long term they will receive a payback for this. If the technology works the way the experts claim, we would in fact be developing a type of energy that could be used in the next century thus eliminating the burning of carbon fuels. I think this is yet another fringe benefit.

Mr. PEACH. Not from a factoring into an estimate, but just to make a more general comment, when you look at tradeoffs among different kinds of decisions, although this does not relate directly to the weapons production, there is a benefit if we can develop a technology that is being viewed as being more inherently safe and would give us an opportunity to move in a more inherently safe fashion with a nuclear option. That is one of the benefits of being able to develop that technology, if we can do it successfully, but there is a technical risk involved.

Senator SYMMS. Thank you very much. I appreciate that.

Mr. Chairman, thank you very much.

Senator ROBB. Let me ask just a couple of questions and then we will wrap things up at this point. Mr. Culp, I did not want you to not have a chance for rebuttal, since I had asked both Mr. Peach and Mr. Barker to respond to your presentation, which seemed to offer some opportunity to make some comparative evaluations. Would you like to respond before I——

Mr. CULP. I think on the one point, on the need for additional plutonium supplies, there is a difference of opinion. We believe, and other people that have taken a look at this believe, that the United States has currently more than adequate supplies to last indefinitely into the future.

There is currently a stockpile, we estimate, of perhaps 100 metric tons of plutonium in this country. The third element of material that is used in nuclear weapons, highly enriched uranium, has not been produced in this country for 25 years. Then President Johnson, in 1964, took a look at what he thought the long-term needs for highly enriched uranium would be for the country, and decided to shut down all the production reactors that produced highly enriched uranium. Under five Presidents now we have had no production of this material that is one of the critical ingredients for most of the nuclear warheads that we have in this country.

We think the same situation is also true with plutonium. It has a very long half-life, some 24,000 years before half of it decays. In human terms, or in congressional terms, it is almost permanent. So, there is a disagreement between ourselves and the Department of Defense as to the need for additional plutonium supplies.

Senator ROBB. Thank you, Mr. Culp.

Mr. Peach, just a general question, if I may, particularly from the budget perspective, as opposed to the technical perspective, and I do not profess to be able to fully appreciate some of the nuances involved. But the magnitude of the cleanup effort today is in the range of the magnitude of the cleanup effort in the S&L situation as far as the budget and the taxpayers are concerned. Those numbers have a tendency to be a little slippery from time to time and to expand almost exponentially over a period of time, in terms of what the true costs are.

Could you just give in lay terms, give us some indication of the credibility of the figures that you are using today, given the assumptions, obviously, with respect to the generation of any additional cleanup necessity and the technology that is available for cleanup today? Can we rely on the figures—I think $155 billion was the one that was used most recently in testimony in this particular area—how much reliance can we place on those from the strictly dollars and cents point of view?

Mr. PEACH. Let me use the Department of Energy's modernization study, which calls for $81 billion. You are dealing with information in a lot of the areas that are not budget quality and it is going to be subject to growth. The $52 billion that they have in there for modernization, you probably have at least a solid basis, because you are talking about actual construction and other kinds of activities you are going to undertake.

Although I have to tell you that I hope Admiral Watkins 'management system will work better there, but the history of cost growth in Department of Energy projects, once they have been under way, has not been all that good. So, I do not know how much solace you can take from that, but let us hope it is going to be better as we move on into the future.

When you move to the environmental area, they talk about $29 billion, on a problem that could range from $40 to $70 billion. This is not budget quality information at all. You are still trying to define a problem and you are trying to define a problem of environmental cleanup, where the approaches that we can use to cleanup have not even been decided upon, and where you are going to have to be moving into areas dealing not with waste that is just hazardous, but radioactive also. So you have got unique kind of steps you have got to take. Further, you have got a history of looking at superfund-type projects that show tremendous cost growth as the EPA has tried to move forward on clean up. So, it is not budget quality and there is a high potential for cost growth.

One area their modernization plan does not deal with is the decommissioning and decontamination of facilities that may be taken out of use. Only those facilities now inactive do they deal with, and there are others that they talk about taking out of use, and again we are going to be dealing in an area we do not know a lot about in looking at cost of decommissioning and decontaminating some of those facilities.

Three Mile Island, once we talked about acting on it, has grown in cost exponentially in terms of what it has cost to deal with the clean up and the reactor dismantling, over what was expected. So, I think the potential for cost growth is greater once you actually begin work.

Senator **Robb**. Thank you, Mr. Peach.

Dr. Barker, one of those unfair "when did you stop beating your wife" kind of questions, to wind things up today for you, if I may.

You indicated with a great deal of conviction that DOD stood squarely behind the proposal for the redundant reactor production facilities. Question: Are both reactors contemplated in your 5-year budget? Secondly, in the world in which we live, the real world of severe budget constraints, would DOD be prepared to shift funds to DOE, is it a high-enough priority to consider that in the event that DOE's budget could not provide for the second reactor?

Dr. **Barker**. I believe that same question was asked of the Acting Secretary of Defense yesterday, and I believe he answered in the affirmative. Let me just underscore the statement I made in my earlier comments.

The fact that there is an independent Department of Defense and an independent Department of Energy is something that has been very important to this Nation up until now. Part of their being an independent Department is each Department going to OMB, dealing with the Congress, and seeking funds to support their own programs. Certainly, Defense believes that it is an Energy responsibility, according to the partitions of responsibilities determined by the Congress, going back to the Truman administration and reinforced by every administration since.

But my boss yesterday said if the crunch came, we would be willing to fund it, and that is what is on the record.

Senator **Robb**. I was not able to attend that part of the hearing, but it is always reassuring to know that somebody else has already walked the plank on that particular issue.

Dr. **Barker**. If I could only make one further point, Senator Robb, Mr. Culp and I cannot debate in front of this committee whether or not there is adequate plutonium, and therefore I am not in the position to confirm or deny the kinds of numbers he has been using or his bottom line conclusions, but certainly the members of this Committee do have the necessary clearances and I invite you to take a look at the supply-demand situation on the plutonium side, and I think you will conclude, as we have, that we cannot be in a very comfortable situation without further plutonium metal available to us, and the only facility in the near term that we can count upon to provide that material is the SIS facility.

Senator **Robb**. I did not assume there would be any benefit to proceeding on the technical aspects until we get to a classified forum for that particular question.

Senator Symms, did you have any concluding questions?

Senator **Symms**. No, further question, Mr. Chairman. I just want to thank our panel members. I showed this chart earlier, when Secretary Watkins testified, that shows where we were historically on plutonium and tritium production capabilities as compared to where we are today. I do not know whether our reporter can produce something like this for part of our record, but I would like to have it be part of the statement this morning, because I think it is very appropriate to this discussion.[1]

Senator **Robb**. Mr. Peach?

Mr. **Peach**. Mr. Chairman, you probably should be aware that one of the other areas that we are looking at or have been asked to look at by the Senate Armed Services Committee was matters related to material requirements, both plutonium and tritium. We have that work under way for them.

Senator **Robb**. Thank you, Mr. Peach.

Senator Symms, do you have anything else?

Senator **Symms**. Nothing else, sir.

Senator **Robb**. If not, may I thank the panel again. Although some of the senior members on both sides of the aisle were absent, they are over doing hopefully our work at this particular point, all shall be revealed in due course. But we appreciate very much your being with us, your testimony and any additional submissions that you would like to provide for the committee will be available for deliberations and markup, and we thank all three of you and the others who were in attendance this morning for being a part of this.

The committee stands adjourned.

[Whereupon, at 12:20 p.m., the committee was adjourned.]

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[1] See p. ——.

TESTIMONY TO
THE SENATE COMMITTEE ON THE BUDGET

ROBERT C. TRAYLOR
VICE CHAIRMAN AND FOUNDER
MANAGEMENT ANALYSIS COMPANY

March 14, 1989

Mr. Chairman, members of the Committee, ladies and gentlemen: I am Robert C. Traylor, Vice Chairman of the Board and one of four founders of Management Analysis Company headquartered in San Diego, California. I have bachelors and masters degrees in engineering, have served in the Navy nuclear program, and have been working in the nuclear energy business since 1958 as an engineer, physicist, manager, and consultant. I have been asked to testify before you today to share my views on the Department of Energy's Defense Programs Modernization Plan. By that I mean:

- Corrective environmental, safety and health actions at all sites (e.g., safety upgrades)
- Environmental cleanup of active and inactive sites
- Waste management
- Modernization and maintenance of facilities and equipment (including acquisition of major systems such as NPR and SIS)
- Decontamination and decommission of unneeded sites from prior environmental effects

Management Analysis Company (MAC) has earned its reputation over the past 15 years as a management consulting company providing services to our nation's electric utility industry, with special emphasis on the unique management aspects of nuclear facilities during both the construction and operation phases. This includes environmental and safety licensing considerations and interactions with the Nuclear Regulatory Commission (NRC) and the Institute of Nuclear Power Operations (INPO). MAC has often been called upon by nuclear utilities to assist them in improving their nuclear projects and programs, to help them develop improved business plans suited for a rapidly changing world, and to help them improve the safety, quality, productivity and profitability of their operations. Our company has been intimately involved in all phases of commercial nuclear management, in all regions of the United States, and in all commercial plant designs and technologies — PWR, BWR, and HTGR. We have assessed and offered guidance on improvements to a wide diversity of utility managements. We are well known for our candor.

This background is especially important as the NRC and INPO regulations and practices developed for the commercial nuclear industry are adopted by the Defense Programs facilities and operations. In that regard, I might mention the Chairman of the Board of MAC is retired Admiral "Dennis" Wilkinson, the first skipper of the Nautilus and the founding President of the Institute of Nuclear Power Operations. INPO was formed by the nuclear utilities and has contributed to the tremendous improvement in the operations, safety, and reliability of commercial nuclear power plants.

MAC, through its subsidiary company, MAC Technical Services (MACTEC), is currently providing advisory services to the Department of Energy at various locations. In support of the Defense Programs, MAC was requested to bring the view of private industry, and the view of a company which had acted in an independent, problem identification and resolution role for the nuclear electric utility industry, into a final review of the Modernization Plan. We read and carefully analyzed all pertinent documents leading to the Modernization Plan, visited a number of DOE sites, and interviewed key officials and support staff. MAC in essence was asked to bring our accumulated experience and knowledge of all the assessments we have made at more than 25 private sector nuclear sites to bear on the internal DOE assessment of its own Defense Program facilities. This is an innovative approach by the Department, and one which I believe reflects a genuine attitude of openness and candor.

MAC was asked to review the Modernization Plan from an independent, private-sector, commercial practices, and business perspective. In the course of our review, it became clear to us that a new management structure would improve the program implementation. We therefore made recommendations for modifying the DOE's Defense Programs organizational structure. It appears to us that these recommendations generally agree with the observations made by Secretary Watkins during his confirmation hearings concerning the necessity to reassess the structure and management approach of the DOE. Subsequent to our review, MAC was asked to address how the implementation of the Modernization Plan could be carried out most effectively, and we are currently in process of performing that work.

OBSERVATIONS ON THE MODERNIZATION PLAN

Before discussing my observations of the Modernization Plan, it is important to place a historical perspective on the total defense programs complex, which was state-of-the-art at the time it was built. All of the then existing knowledge of the risks and required protection systems were considered in the design, construction and operation of those facilities. When the Atomic Energy Act was written, moreover, it stated that the paramount objective of the Act was to provide for the national defense. I can testify as a former member of Admiral Rickover's staff that there was a high sense of mission-oriented urgency to the production of weapons and weapons delivery systems. I can also testify that prudent care was taken in the areas of safety and environmental protection because each of us realized that any accident, regardless of the extent or cause, would cause massive damage to the programs. Further, it should be noted that during this mission-oriented period, there was little funding either requested or granted for ongoing maintenance of the complex. Rather, the mission of "delivering the goods now" was held paramount. Today, the DOE attitude has changed — delivering the goods is still very important, but not at the expense of the environment. In my view, known continuing damage to the environment from operations has generally stopped.

Now, of course, the balance of priorities has been changed, and for good reason. New laws and requirements reflecting new knowledge and new sensitivities have been placed retroactively on facilities over the past 25 years. These laws and requirements were placed upon a complex which was already mature, and which could not have been built in a manner intended to meet future unknown regulations. These facts are important to erase the erroneous perception in some quarters that DOE knowingly aided and abetted in willfully violating current safety and environmental regulations at the various complex sites. Rather, new priorities and mission requirements were established which did not exist when the complex was first constructed. While it is important to upgrade rules and regulations based upon new knowledge, and to implement them correctly, it is neither appropriate nor fair to assume the DOE intentionally chose not to implement innovative procedures and lessons learned from 30 years of operations. The current situation is primarily a result of the advancement of science and our knowledge and their effects on facilities nearing the end of their useful lives.

An item of critical importance is the present staffing of the Defense Programs organization. We at MAC have been impressed with the dedicated, loyal and conscientious staff that we met at all levels in the organization. It is, in fact, this staff which has allowed the program to succeed so far in meeting the mission requirements. As we looked at the modernization plan, it became clear to us that the organizational structure of Defense Programs, and that of the remainder of DOE where it affects Defense Programs, was cumbersome at best and becoming increasingly unworkable. The Assistant Secretary for Defense Programs (ASDP) has all the responsibilities for meeting the mission requirements, but not the authority to fulfill those requirements. Certain functions can, and do, bypass the ASDP in the management chain. Clearly, the successful operations to date arose from the informal network that exists among the principal managers. It is their personal dedication which has allowed the complex to successfully function despite an inadequate management structure.

But, this situation may not long be able to continue. Many of these experienced and dedicated individuals are now retiring, or have indeed already retired. Their replacements may not be able to make the informal network operate successfully. Additionally, because of the present non-competitive salary structure for upper level professional positions, I question how long the remaining dedicated staff will stay. Further, with the new emphasis on the mission requirements of Defense Programs that deal with the environment, health, safety, and because of the need for more open communications with the public, additional kinds of management skills and orientations are now required.

In our work for Defense Programs, therefore, we developed management structure alternatives which were less dependent on the informal management network by clarifying roles, responsibilities and accountabilities. Additionally it added the required management capabilities consistent with the newly emphasized mission requirements. And it also suggested raising the stature of the DP management organization to a level more commensurate with its responsibilities.

This staffing recommendation may require changes to the existing enabling legislation for DOE to allow full implementation. However, major portions of it can be carried out within the present law. It will be up to the new Secretary of Energy to decide if these recommendations are to be implemented, or if other priorities within the DOE mitigate against the recommendations. Since our recommendations were made from a Defense Programs-only perspective, there may well be excellent reasons why our recommendations may not be applicable to the overall DOE management structure. However, we firmly believe that, unless the present structure of Defense Programs is altered, it may well not be able to rise to the more difficult demands of the future. The tasks outlined in the Modernization Plan are too large and important to tolerate protracted delay, inefficiency, or failure. Organized and competent staffing and management structures are key to ensuring success of the program.

DISCUSSION AND RECOMMENDATIONS TO THE COMMITTEE

There are five general categories of work to be accomplished:

- Corrective environmental, safety and health actions at all sites (e.g., safety upgrades)
- Environmental cleanup of active and inactive sites
- Waste management
- Modernization and maintenance of facilities and equipment (including acquisition of major systems such as NPR and SIS)
- Decontamination and decommission of unneeded sites from prior environmental effects

Some of these categories require funds for new acquisitions to bring the complex back into operations. Additionally, as a businessman, it is clear that all operations must reinvest a portion of its depreciation funds into upgrading or replacing its capabilities, or the business will atrophy over time. In the instance of the DP complex, this fiscal planning must provide for decontamination and decommissioning also. In government operations such as the weapons complex, the same logic applies, except that these operations do not generate depreciation funds to carry out the modernization. Nonetheless, it is clear from the present situation that a similar funding mechanism is required to keep the complex up-to-date and efficient.

Safety actions at existing facilities are already being planned, and a program for corrective actions is emerging. As in the commercial nuclear program, we must ensure that this program contributes to safety, rather than unnecessarily complicating operations, thus actually reducing safety. Better training and management of people is the important element for improved safety at existing facilities. The creation of an independent oversight function, similar to that provided for commercial nuclear facilities, is a positive step for enhanced safety.

As to the environmental cleanup programs, we believe general guidelines for prioritizing the effort should be developed. From our perspective, we would suggest the following guidelines:

I. Deal with the known major problem areas first (the "worst-first" approach), but in a prudent and affordable manner.

II. If an environmental problem will soon migrate off-site at dangerous levels, act on it as soon as reasonably practicable.

III. Otherwise, be discriminating about how to solve the problems.

IV. Also be discriminating about when to solve non-urgent problems. We have time to respond appropriately, thoughtfully, and prudently-giving balance to any competing imperatives.

V. Don't attempt to restore all sites to a "greenfield" condition. A better use of resources may be to seal and isolate some sites.

VI. Focus on the consequences of substances, not the existence of substances.

VII. Where uncertainty of requirements, costs, and schedules exist for non-urgent problems, take prudent time and actions to better define alternatives, tradeoffs, costs, and schedules.

VIII. In addition to innovation of technologies, cleanup of past environmental impacts will require innovation of laws, regulations, and agreements. Agreements must be coordinated in accordance with established priorities to keep from tying the hands of the Administration and the Congress with future budget commitments.

Congress is the proper forum for balancing the prudent and timely application of laws where they unwittingly conflict. Application of the above criteria may require separate specific legislation for limited application of existing laws to DOE Defense Production facilities. For example, current interpretation of RCRA and CERCLA provide only for "greenfield" restoration, and both laws assume urban sites. Neither of these assumptions are appropriate for remote DOE sites.

Planning for waste management (including vitrification facilities and disposal, storage, and processing) at all major sites appears to be well underway.

Thus in some cases, we would recommend that Modernization Plan programs be implemented immediately, while in other cases, a short - and I emphasize the word short - period of further study and parameter setting is needed. For example, the WIPP project is a case in point. WIPP at present is at an impasse. This is not caused by inaction of the Congress or inaction of DOE. Rather it is the result of unintended consequences of conflicting rules and regulations. The Atomic Energy Act, The EPA Act and the RCRA Act all apply to this program, but are unfortunately in some areas in conflict with each other, and are being applied to a project which was not envisioned when the various Acts were passed. Legislation is now being discussed to remove this unintended roadblock, which shows promise of clearing the way to completing this critical project. We would strongly urge all parties to look carefully at whether similar situations are likely to occur with individual programs within the modernization plan where prior thought could remove such obstacles. Cases in point could be the proposed moving of Rocky Flats, Fernald and the nuclear operations at Mound Laboratories. While the plan addresses the fact that these facilities are to be moved, the relocation sites are not yet identified. If WIPP is any indication, it would be well to establish the new sites early and in such a way that procedural issues and well-intended but conflicting laws do not contribute to additional wrangling, additional problems, additional time, and additional and unnecessary costs.

The modernization plan detailed the requirements for the modernization and maintenance of facilities and equipment required to restore the weapons complex to full production status. The plan identified the new facilities and equipment, facility upgrades, and recommended a reinvestment strategy to maintain the mission critical RD&T, weapons production, materials production and other critical functions of the complex. I concur with the recommendations of the modernization plan in this area.

CONCLUSION

Our work at DOE in support of the Defense Program's modernization study has convinced us that this organization is implementing a program which can be a success. Defense Programs recognize what now are clearly errors of judgment in the past, which have been brought to public attention through the increasing knowledge of this 45 year-old technology. I am convinced that Defense Programs is working hard to minimize these past errors as well as is working hard to prevent new problems from occurring. Defense Programs is putting in place an effective management control structure to implement the modernization plan if the plan is authorized and funded by the Congress. For instance, DOE regulation 4700.1 is an excellent management and project control tool, which should be used on each applicable program and subprogram. In addition, DOE is studying ways to achieve the optimum management control over the entirety of these programs so that DOE, the Congress, the Administration and the public can be both confident and informed as to progress on all aspects of the modernization program. The Secretary of Energy has directed Defense Programs to construct a realistic five-year program for the initiation of this long-term plan, in order to give all interested parties the maximum possible information and assurance that the DOE Defense Programs has the situation in hand, and that the solution we all want is forthcoming. Attention to building a competent management structure and program follow-up system should minimize the anxieties of those who believe that tight Congressional oversight at a micro level is necessary. I do not believe that it is, and further, I feel it could well be counterproductive to the overall success and economy of the plan.

ile this modernization program is underway, it is important that the basic mission of providing a crucial element in this Nation's nuclear deterrent not be interrupted. This will call for a balance between production, safety and environmental goals, and a balance between funds to be spent and the level of restoration that is desirable. Achieving proper balance between competing imperatives is always a controversial process, and this is an instance that I am confident will be debated before this committee and other appropriate forums. Let me make it clear that continued environmental damage is both unnecessary and unacceptable. Any imminent threat to health and safety from past environmental damage must be dealt with expeditiously. We must maximize nuclear safety and minimize the continuing impact on the environment - but not at unlimited financial or production cost; and we must minimize the financial cost - but not at the expense of health, safety or our environment. Balancing these equations will be a formidable task, and is one in which the wisdom of the members of this panel and your colleagues in the Congress will be sorely needed. I would urge you to enter into this debate armed with scientific evidence about the options open to you, and with a logical concern for the level of protection that is adequate, and represents the greatest return for the dollars spent. Returning every site to its pristine condition may not be necessary or logical at this time, and we will look to you to judge what gives the Nation the protection it requires for a reasonable expense. I would hope that all the available talent will be called upon to help in this coming debate to ensure that our children and grandchildren have a legacy of safety and a healthy environment without an overwhelming financial burden to carry. I stand ready to answer your questions at this time.

United States General Accounting Office

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Modernization and Cleanup Problems are Enormous in the Nuclear Weapons Complex

Statement of Keith O. Fultz
Director, Energy Issues
Resources, Community, and
Economic Development Division

Before the
Committee on the Budget
United States Senate

Mr. Chairman and Members of the Committee:

We are pleased to provide our views on what is needed to clean up and modernize the Department of Energy's (DOE) nuclear weapons complex. My testimony is based on a large body of work--over 50 reports and testimonies since 1981--that we have completed on the environmental, safety, and health aspects of DOE's nuclear weapons complex. Cleaning up and modernizing the complex will be a formidable task which is estimated to cost up to $155 billion. Let me stress that while cost estimates are not budget quality, they do serve to illustrate the magnitude of the problems within the complex. As more information is gathered, indications are that the final cost could be higher.

In previous congressional testimony, we have used the problems in DOE's nuclear weapons complex as an example of how we have not invested wisely in key government operations. We have consistently made short-term decisions which now leave us with extremely serious problems that will require long-term solutions with enormous costs. DOE's own studies agree that production of nuclear material has been emphasized to the detriment of safety and environmental concerns. They also point out that capital investment to maintain many key components in the complex has averaged less than 2 percent, in contrast to a 4- to 7-percent level normally associated with industrial facilities.

The problems at DOE's complex are so serious that they have at least temporarily shut down key facilities that affect the nation's ability to produce nuclear material for weapons. Dealing effectively with these problems represents one of the major areas of explosive unfunded costs that will have to be dealt with at the same time we address the budget deficit. A comprehensive and well-planned approach to address the problems is overdue, and further delays will only worsen the situation.

In the last session of the Congress, the debate was over whether major problems existed in DOE's nuclear weapons complex. The debate in this session can move from the recognition and acceptance that there are serious problems in the nuclear weapons complex to how to fund and deal with them. The role of this Congress and administration will be to strike a balance between maintaining our national security and protecting the public and the environment, as well as establishing the pace at which the nation moves its weapons complex into the twenty-first century.

The remainder of my testimony provides perspective on (1) the scope and direction of DOE's modernization and cleanup plans, (2) the reasonableness of the cost estimates to implement these plans, and (3) our views on DOE's fiscal year 1990 budget. Before getting into the specifics, I would like to begin with an overview of the complex and its problems.

THE NUCLEAR WEAPONS COMPLEX AND ITS PROBLEMS

Since World War II, nuclear weapons have played a dominant role in the nation's defense strategy. DOE oversees production of weapons at 16 major installations located around the country (see attachment I). The complex's basic mission is to produce nuclear material (e.g., plutonium and tritium) for weapons and naval fuel.

DOE funding requirements for nuclear defense activities in each of the last 3 years have been about $8 billion. In total, the complex represents a public investment of about $100 billion. It includes a wide variety of plants with interrelated purposes, such as nuclear reactors, specialized laboratories, uniquely designed plants for fabricating nuclear material, and nuclear waste facilities.

DOE's nuclear weapons complex, considered in its entirety, is one of the more potentially dangerous industrial operations in the world. The operations routinely use and generate large quantities of a wide range of hazardous and radioactive materials. These materials must be handled, transported, and disposed of carefully by workers not only to prevent exposure to themselves but also to prevent these materials from being released into the environment. Because of lethal levels of radiation and high-level heat generation, many of the materials must be handled with special shielded equipment to prevent worker exposure.

DOE operations also involve controlling nuclear reactions and handling highly fissionable nuclear material. The unfortunate Chernobyl accident demonstrates the more dangerous aspects of controlling nuclear reactions and nuclear material. Finally, DOE operations must be protected against the more commonplace industrial dangers, such as fires or other processing accidents.

GAO's work over the past several years has described a variety of unresolved safety, environmental, and operational problems. Specifically, we have called attention to the following:

-- Serious safety questions regarding the operation of government production reactors at Savannah River, South Carolina, including the adequacy of the emergency cooling systems and the need for ultrasonic testing to examine the reactor tanks for the possibility of cracks.

-- The problems at DOE's facilities that result from aging and inattention to capital improvements. For example, some buildings and equipment have deteriorated to the point where they now have safety and operational problems. Furthermore, some equipment and/or processes used within the complex are obsolete, making repair work difficult and spare parts virtually impossible to procure.

-- Over 3,000 inactive waste sites at DOE facilities--the result of past hazardous and radioactive waste disposal practices--that will require action.

-- Groundwater and soil contamination at DOE installations around the country, some at levels hundreds to thousands of times above standards. At some locations, such as the Y-12 Plant in Tennessee, environmental contamination has spread off-site.

In March 1987, we pointed out that DOE did not have an adequate plan for addressing the wide-ranging problems it faces and assuring the Congress that it could meet the nation's need for nuclear material for weapons. We called on DOE to develop a strategic plan setting forth (1) the projected facility requirements for an updated nuclear weapons complex; (2) a comprehensive picture of the environmental, safety, and health issues that had to be addressed; and (3) a framework for prioritizing the billions of dollars in federal expenditures needed to remodel or build new facilities, as well as to clean up environmental contamination.

In December 1987, the Congress mandated that the President prepare such a plan to modernize the nuclear weapons complex.[1] DOE delivered that plan to the Congress early this January.[2] While DOE was preparing the plan, more safety and health problems surfaced within the nuclear weapons complex. These problems have resulted in the unanticipated shutdown of key nuclear operations. At present, DOE's reactors at Savannah River, South Carolina, and Hanford, Washington, are shut down. Also, a key plutonium processing building at the Rocky Flats Plant in Colorado was recently shut down for almost 4 months for safety reasons.

Correcting the problems that have been enumerated over the last several years will be difficult. According to the plan DOE recently issued, the entire complex will require extensive modernization over the next 20 years and beyond. The report also states that the costs for environmental restoration will be significant during this modernization period. Specifically, the plan calls for additional spending of $81 billion--$52 billion for modernization and $29 billion for environmental restoration. The plan is an important document because it outlines DOE's current thinking regarding the pace and direction of modernizing and cleaning up the complex.

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[1] National Defense Authorization Act for Fiscal Years 1988/1989 (P.L. 100-180, Dec. 4, 1987).

[2] United States Department of Energy Nuclear Weapons Complex Modernization Report (Report to the Congress by the President, Dec. 1988).

DOE FOCUSES ON MODERNIZATION

DOE must deal with modernizing its aging complex because of past mistakes--overemphasis on production, inattention in the environmental area, and complacency with regard to safety. While the modernization plan lays out DOE's view of what facilities will be needed in the year 2010 to meet production needs, it does not clearly define what environmental cleanup problems will be resolved during the same time frame.

By 2010, if the plan is followed, DOE will have upgraded many of its plants and constructed two new production reactors and a special isotope separation facility. It will have largely relocated and/or phased out other installations, such as the Rocky Flats Plant in Colorado and Fernald in Ohio. Modernization activities would essentially be completed by 2010, and the nation would have a revitalized weapons complex. However, problems in the environmental area would still be with us. In our opinion, the plan does not adequately address the cleanup of existing facilities and decontamination of facilities as they are retired from service. The plan provides little perspective on how these important problem areas will be solved or what needs to be done in these areas between now and 2010.

While the plan does provide DOE's views on the future configuration of the complex, it is just a first step that raises a series of issues that the Congress will need to consider. For example:

-- Should both planned new production reactors be given top priority? DOE's plan calls for two new reactors. Reactors will be built at different sites, and one will use a new technology.

-- Does DOE have the capability to meet nuclear material needs while the new reactors are being built? Currently, all of DOE's production reactors are shut down. It is unclear to what extent the reactors can be relied upon in the future to produce nuclear material.

-- Should the special isotope separation facility be a priority activity? DOE's plan places high priority on this project, which is to be used to convert fuel-grade plutonium to weapons-grade plutonium. Given the other planned upgrades of plutonium facilities within the complex, questions regarding the emphasis placed on this facility need to be addressed.

-- Are DOE's plans to upgrade facilities that it plans to later phase out appropriate? DOE's plan calls for a number

> of upgrades at facilities it plans to shut down within several years. The trade-offs between upgrades and eventual shutdown need to be carefully studied.

DOE's plan places modernization on a faster track than environmental cleanup and decontamination. DOE is still studying the extent of contamination at its facilities. Therefore, it has not made key decisions on the extent of environmental cleanup or which sites get cleaned up first. Also, the Congress should consider the issues we have just raised, as well as others that may arise in deciding priorities and balancing modernization and cleanup needs. Accordingly, we believe the plan should be viewed only as a first step in establishing a national consensus to rebuild and clean up the complex. We are currently working with a number of congressional committees on many of these issues.

COST ESTIMATES VERY UNCERTAIN

Next, I want to briefly discuss the reasonableness of cost estimates set forth in DOE's modernization report. We have previously reported that the total cost of addressing the major problem areas within the complex is estimated to be up to $155 billion.[3]

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[3] Dealing With Major Problem Areas in the Nuclear Defense Complex Expected to Cost Over $100 Billion (GAO/RCED-88-197BR, July 6, 1988).

The modernization plan's calculation of costs differs from ours in methodology and scope. For example, the DOE modernization report highlights $81 billion for modernization and environmental restoration over the next 21 years. This $81 billion represents the additional funds (an increment) needed during the next 21 years over and beyond funding DOE programs each year at the fiscal year 1989 level of approximately $8 billion. Further, the $81 billion represents costs only through 2010. In the environmental restoration area, DOE recognized that total costs could be greater than $60 billion and would extend beyond 2010. (Attachment II provides a more detailed comparison of DOE's modernization report and the GAO report.)

As I said earlier, it is important to note that all of these estimates are not budget quality and are designed only to approximate the funds needed. In the final analysis, the true cost may be far higher. For example, some of the planned facilities will use new technologies, such as the isotope separation facility and a high-temperature, gas-cooled reactor. DOE's construction of such facilities has been prone to huge cost overruns. Further, many uncertainties exist with regard to how we can clean up existing environmental contamination and decontaminate large nuclear facilities. DOE's modernization plan does not shed much light on what cleanup procedures will be used. Finally, we are not sure that all the problems within the complex have surfaced. For example, in the environmental area, uncertainty still exists not only regarding the size of problems but also regarding the extent to which DOE sites can be cleaned up. Some locations at some DOE sites may be irreversibly contaminated.

DOE'S FISCAL YEAR 1990 BUDGET

Next, I would like to briefly discuss DOE's fiscal year 1990 budget request for the complex. The new administration recently amended this request by providing an additional $360 million for environmental, safety, and health activities, so I will be referring to the amended dollar amounts here today. Currently, of the $9.4 billion requested for the complex, approximately $3.7 billion is earmarked for addressing the problems of the complex. According to DOE, this level of support represents the first step toward modernization and cleanup of the nuclear defense complex.

The $3.7 billion for addressing major problem areas within the complex represents a $1.1 billion, or 42 percent, increase in funding over fiscal year 1989 levels. More specifically, funding for modernization activities has been increased by $471 million to $1.3 billion, which allows for further development of new production reactors and the special isotope separation facility. Funding for environmental compliance and safety and health activities has been increased by $383 million to almost $1.4 billion, and funding for environmental cleanup was increased by $242 million to $401 million. In the fiscal year 1990 budget request, radioactive waste management funding was decreased by $21 million to $575 million. While DOE is requesting increased funding for many problem areas, it is important to note that, given the magnitude of the problems and the enormity of the costs to correct them, the funds represent only a small downpayment on resolving the problems of the complex. This is particularly true in the environmental cleanup area, where DOE plans to spend $401 million on a problem which may cost over $60 billion.

Because of the magnitude of problems facing DOE, and the limited resources available in a deficit era, the budget request will be closely scrutinized. In our view, there are a number of key questions that need to be addressed:

-- Are DOE's priorities among various modernization and environmental cleanup activities appropriate? Earlier in my testimony, I raised a number of important issues associated with the modernization plan, such as whether both new production reactors should be given a top priority. These issues must be weighed in the budget process against other needs, including safety upgrades of existing facilities and environmental cleanup. Finding the proper balance between these important areas will be difficult.

-- Is DOE's funding for environmental cleanup sufficient? In view of the magnitude of the environmental problems facing DOE, its fiscal year 1990 budget request is small. Possible increases in funding will likely be discussed in the budget process. We believe any discussion should include consideration of DOE's ability to effectively spend additional environmental cleanup funds in fiscal year 1990.

In order to solve the problems of the complex, DOE must gear up to effectively spend billions of dollars each year not only on modernization, but also on environmental cleanup. Assuring that these funds are effectively spent will be as difficult as finding the funds themselves.

SUMMARY

In summary, the ramifications of the deterioration of our nuclear weapons complex are enormous and raise serious budgetary, national security, and environmental issues.

-- From a budgetary perspective, estimates to revitalize the complex range as high as $155 billion over the next 20 to 30 years. The budget proposal before you is only a very small downpayment on this enormous bill, and the administration has not provided a funding plan that would show how and when the costs would escalate.

-- From a national security perspective, our ability to produce critical nuclear material for weapons is virtually nonexistent at this time. If problems affecting reactor operations are not addressed soon, the country's ability to produce and maintain a nuclear weapons arsenal will be in serious jeopardy.

-- From an environmental perspective, inattention and negligence in complying with environmental laws have contributed to widespread contamination at DOE installations. More ominously, the environmental contamination has spread off-site at some facilities where it could potentially affect the public in surrounding communities. Moreover, some locations at DOE installations may be irreversibly contaminated, and DOE may have to place them in long-term institutional care.

The 2010 modernization plan brings DOE and the Congress to an important crossroad--that of making critical decisions about the balance between restructuring an aging weapons complex to provide new and expanded production capability; ensuring that new and existing facilities meet environmental, safety, and health laws and regulations; and cleaning up the result of years of environmental contamination. The Congress must make these decisions within the framework of the conflicting demands for limited resources necessitated by the budget deficit, while recognizing that the nuclear material from the complex is critical to our national defense.

The 2010 modernization plan is a first step in framing the debate. Today, we have a better understanding of the problems facing the complex. However, DOE is continuing to develop information on the extent of the problems and to address and prioritize what needs to be done to correct them. While all the problems are not yet completely understood, the national debate can now begin to find solutions. Because of the enormous costs associated with the solutions, the Congress will be making decisions about the complex for many years.

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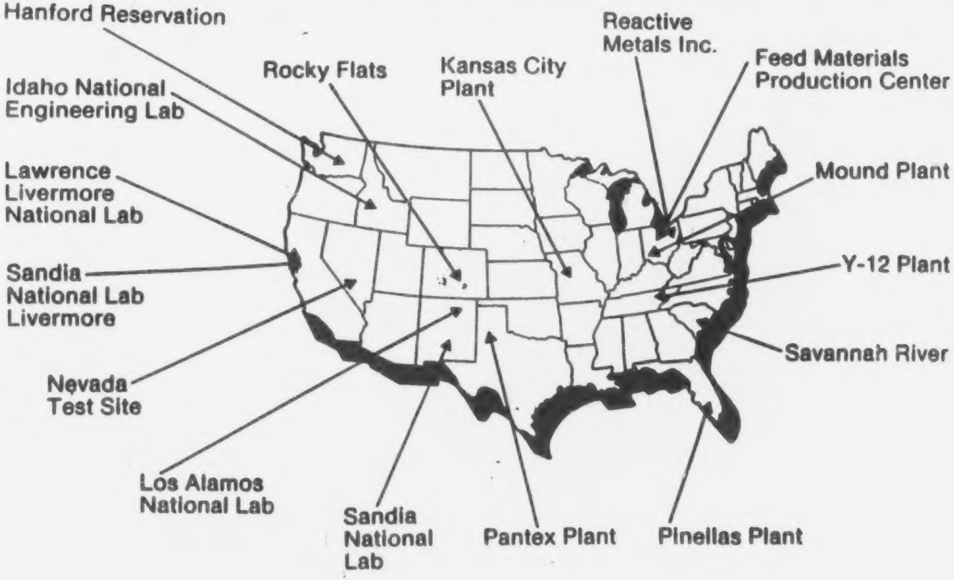
Thank you, that concludes my testimony. We would be happy to answer any questions.

GAO Major Sites Within the Nuclear Defense Complex


Hanford Reservation
Idaho National Engineering Lab
Lawrence Livermore National Lab
Sandia National Lab Livermore
Nevada Test Site
Los Alamos National Lab
Rocky Flats
Kansas City Plant
Sandia National Lab
Pantex Plant
Reactive Metals Inc.
Feed Materials Production Center
Mound Plant
Y-12 Plant
Savannah River
Pinellas Plant

COMPARISON OF GAO'S REPORT WITH DOE 2010 MODERNIZATION REPORT

	Estimate in: GAO July report (billions)	Estimate in: DOE 2010 report[a] (billions)	Explanation of major differences
DEFENSE COMPLEX			
Upgrading existing capabilities plus modernization	$ 35-45	$44.7	GAO has not had the opportunity to review the supporting documentation to the 2010 study.
Disposal of radioactive waste	$ 30	$ 7.5	DOE's estimate reflects the incremental cost. It does not include costs beyond 2010.
Decontamination	$ 15	$ 4.7	DOE's estimate reflects the incremental cost. Further, it does not include active facilities and does not include costs beyond 2010.
Environmental restoration	$ 35-65	$24.1	DOE's estimate does not include all environmental restoration costs nor costs beyond 2010.
Total	$115-155	$81.0	

[a] Incremental costs represent the additional funds needed during the next 21 years over and beyond funding DOE programs each year at the fiscal year 1989 level.

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WRITTEN QUESTIONS FROM SENATOR GRASSLEY TO SECRETARY WATKINS AND THE RESPONSES

Question 1. You made note in your statement of the need for an integrated National Energy Strategy. What specific programs do you have in mind or would you like to see implemented?

Answer. I have no preset conclusions when it comes to the National Energy Strategy, except that it will place renewed emphasis on increasing energy efficiency. The purpose of the National Energy Strategy is to provide to the President, Congress, and the American people a cohesive approach to meeting our energy needs well into the 21st century. This strategy, as I foresee it, will build upon input from the various elements of the Federal government, the Congress, and State and local officials, as well as academia, private industry and environmental groups. I intend to provide a forum for public input through public hearings to be scheduled throughout the country.

The contributions of these sources will be woven together to establish recommendations for a strategy to meet our energy, security, environmental, and growth needs. With a National Energy Strategy, which is developed carefully and in concert with the American people, industry, Congress, environmental and other interested groups, we will be able to make and implement short-term, mid-term and long-term recommendations for legislative, regulatory and policy actions.

This National Energy Strategy will not be merely another statement of policy, nor will it be a document that reflects only my opinions or those of the Department of Energy. This strategy will be a dynamic action plan. It will be reviewed continuously to ensure that changing science, technology and economics are properly reflected.

Question 2. With the tremendous costs associated with cleaning up our nuclear production facilities and the construction of the supercollider, fears have been expressed that in order to pay for these programs scarce funds will be taken away from other necessary programs. Do you share these fears?

Answer. I am committed to creating a new culture of accountability within the Department of Energy with regard to compliance with environmental laws and regulations, and cleaning up the defense nuclear facilities. The costs to do the cleanup of the sites will be in the billions and will take several years to accomplish. In addition, the Department has several major projects underway in other non-defense areas such as super collider. I do not intend to redirect funds from major non-defense projects to use in the cleanup of defense facilities. The cleanup efforts will have a separate authorization, budget and accountability system in order to assure that the objectives of environmental compliance are achieved.

I.D. line 19-585 332